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DARTMOOR IN SOUTH-WEST ENGLAND

# LOOKING AT THE WORLD
## A GEOGRAPHY COURSE FOR JUNIORS

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## BOOK FOUR
# BRITAIN AND ITS WORK

BLACKIE & SON LIMITED
LONDON AND GLASGOW
1939

BLACKIE & SON LIMITED
*50 Old Bailey, London*
*17 Stanhope Street, Glasgow*
BLACKIE & SON (INDIA) LIMITED
*Warwick House, Fort Street, Bombay*
BLACKIE & SON (CANADA) LIMITED
*Toronto*

*Printed in Great Britain by Blackie & Son, Ltd., Glasgow*

# PREFACE

Practical experience has shown that many otherwise excellent Geography books have proved unsuitable because the reading matter was beyond the grasp of the average child. In writing the books of this series, therefore, we have tried to keep within the reading capabilities of the children of the various age groups in the Junior School, and we hope that the series marks a real advance in the presentation of geographical knowledge to these children.

In the first two books the simple sentence is the narrative unit, and one idea is presented at a time. Simplicity of style is also a characteristic of Books Three and Four. Throughout the series we have tried to strike a correct balance between the descriptive and the practical aspects of the subject, and the basic facts of Geography have been carefully presented

The exercises have been so drawn up that the children themselves can work them with as little help as possible Suggestion rather than long explanation is the key-note to the exercises, which are thoroughly practical and which deal with the most important idea in each chapter.

Book One (" Families in Other Lands ") contains picturesque and detailed accounts of family life in lands which represent all the main climatic types The chapters have been arranged to give the full value of contrast The practical exercises are designed to draw the child's attention to the simple natural phenomena of sun-movement and wind-direction

Book Two (" Our Neighbours and their Work for Us ") shows a suitable advance in reading difficulty and deals graphically with the work done in other lands to provide us with the food and materials of everyday life. The practical exercises continue from Book One — they develop the relationship between wind and rainfall, investigate the seasonal as well as the daily movements of the sun, and make a beginning with the drawing of plans.

Book Three (" The World and its Tradeways ") again shows an advance in reading difficulty. It deals with the work and trade of the chief countries of the world. The exercises give practice in the use of maps and scales, besides continuing the observation of physical phenomena.

Book Four (" Britain and Her Work ") teaches the geography of Britain by an intimate consideration of her industries. The practical exercises represent a development of those in the other three books.

The illustrations in all four books have been selected both for their appeal to children and for their geographical value. The maps contain only such information as is relevant to the text The large coloured map on the front end-papers of each book is most important not only as illustrating the text, but also as the basis of many of the questions and exercises.

W A GREEN.
E. G. GREEN.

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# ACKNOWLEDGMENTS

The Authors and Publishers are grateful to the following for the loan of the photographs reproduced on the pages indicated

Port of London Authority (pp 11, 88, 91, 95, 97), Geological Survey and Museum (p 17), The Salt Union Ltd (p 36), The Spalding Bulb Co , Ltd (p 46), Netherlands & Netherlands Indies Information Bureau (p 61), Department of Mines and Resources, Ottawa (p 61), The South Wales Tin Plate Corporation Ltd (pp 64, 72), Ford Ltd (p 66), Kryn & Lahy Ltd (p 69), Clyde Navigation Trust (p 92), The Manchester Ship Canal Co (p 101), The London & North Eastern Railway Co (p 104), The Bolton Master Cotton Spinners' Association and F Brown, Esq (pp 109, 110, 112, 113), The Mersey Docks & Harbour Board (p 115), The Harris Tweed Association (p 118), The International Wool Secretariat (pp 122, 123), Courtaulds Ltd (p 125), Ransomes, Sims & Jefferies Ltd (p 136)

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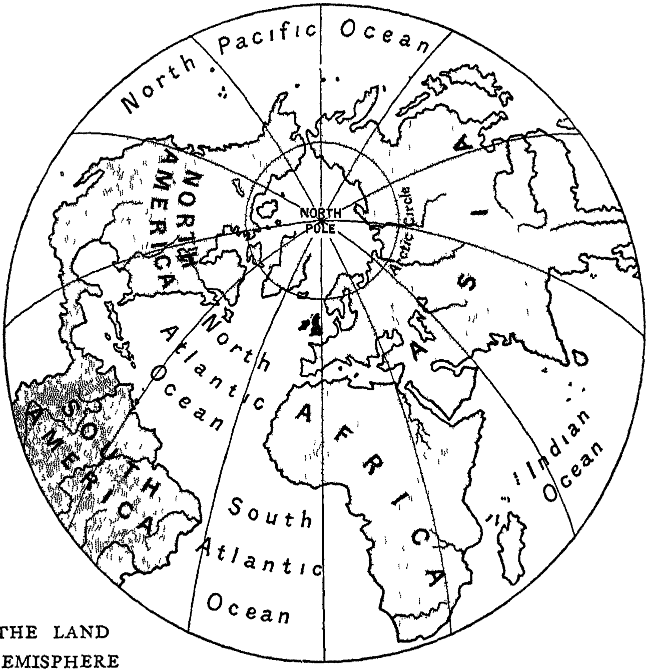
The Authors also make grateful acknowledgment of the help given to them by John Hawkins & Co , Ltd , Cotton Manufacturers, Preston

A DOCK SCENE IN LONDON  BALES OF WOOL ARE BEING UNLOADED FROM THE SHIP

## CHAPTER 1

# LOOKING AT BRITAIN

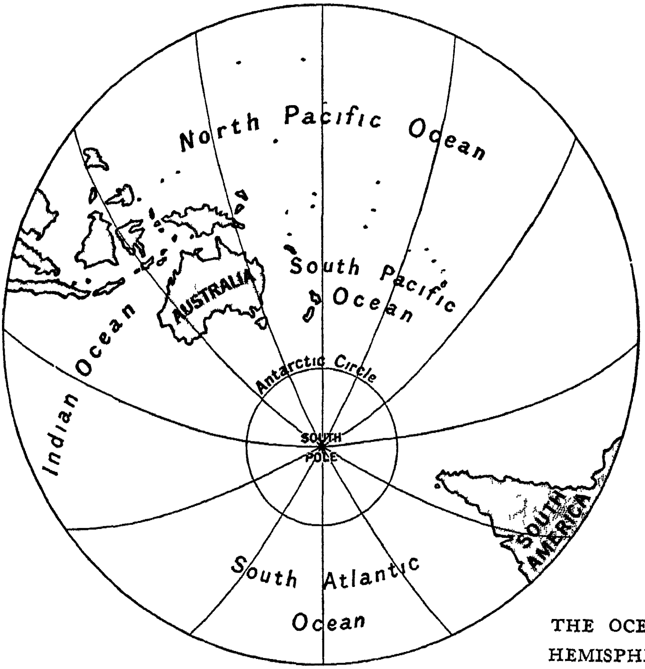
*Cargoes!* Sacks of sugar from the Indies, crates of Spanish oranges, Danish butter, cheese, and bacon, rolls of silk from China and Japan, carcasses of mutton from New Zealand, golden wheat from the Canadian prairies, bales of Australian wool: all these are on their way to Britain even while you are reading these words. These precious cargoes will be brought



THE LAND
HEMISPHERE

into our docks at such ports as London, Glasgow, Liverpool, Hull, and Southampton. Without these foods and raw materials from all over the world, British people would soon be starving, and our workmen idle.

How fortunate it is that the British Isles are in the centre of the trading countries! Above is a view of the globe, which shows you that almost all the lands of the world are grouped around our own on one side of the earth. This half of the world may be called the land hemisphere.



THE OCEAN HEMISPHERE

Above you see the other side of the globe. Most of it is covered with water with hardly any land at all. What would be a good name for this half of the world?

Our position in the centre of the land hemisphere makes it easy for ships from abroad to bring us our imports, and for our ships to take British exports of machines, cloth, and coal to other countries.

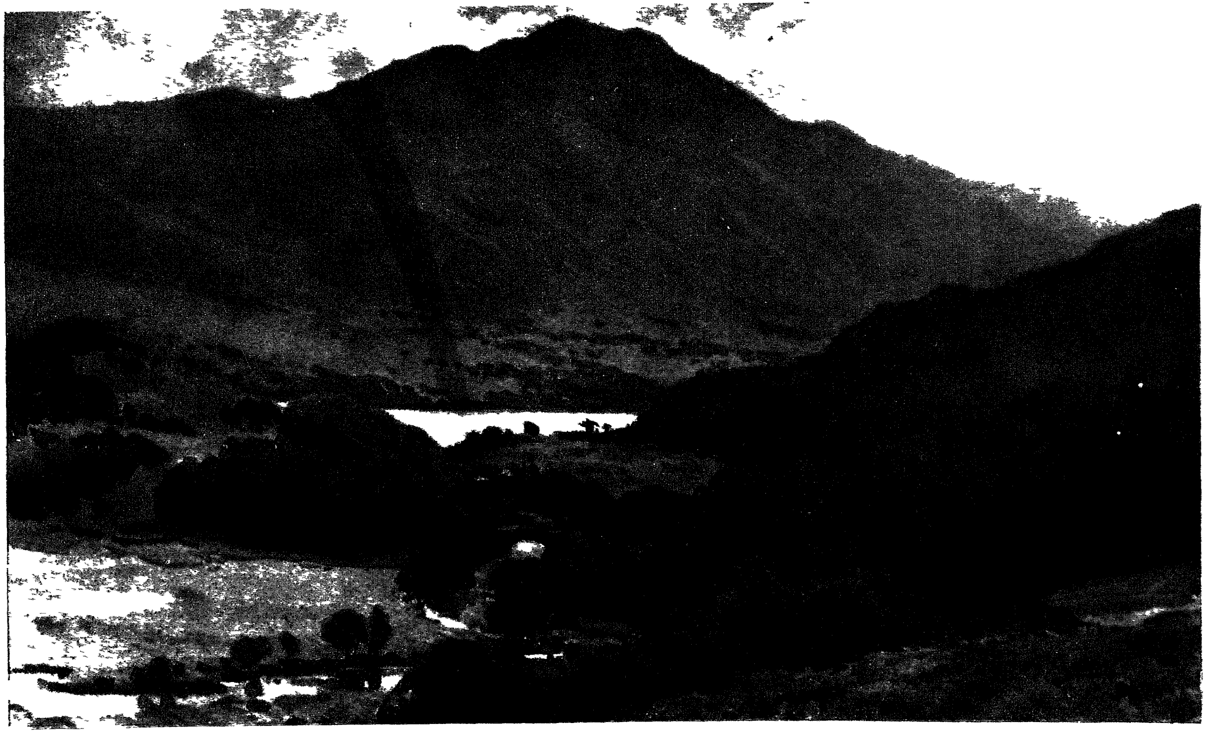
Look at the map of the British Isles drawn inside a map of Australia (p. 14). Australia is thirty times

Some of you live near the bare, rugged mountains in the north, while others live near the flat, grassy farmlands of the south; some of you dwell in the very shadow of great chimney-stacks, and hear the early-morning tramp of the workers on their way to the factory. Others of you, perhaps, live near a harbour, and see the fishing fleet returning home after a night at sea.

I am sure you will agree that to describe this important country of ours, we must find out something about all parts of it. First, we notice that the mountains and plains are not all dotted about, haphazardly, but that they are arranged as though according to a scheme.

All the mountainous land, for example, is in the west and the north. Scotland and Wales are almost completely mountainous and thousands of people visit these countries to view the snow-flecked mountains like Ben Nevis, or lonely, lofty peaks like Snowdon. In England itself people who love mountain scenery must travel either north to the Cumbrian Mountains of the Lake District and the neighbouring Pennine Chain, or west to the mountains of Devon and Cornwall.

Anyone who has visited the Scottish Highlands can never forget the deep leafy valleys, or glens, that lie between the purple, heather-clad mountains. Through the glens flow the sparkling streams, here



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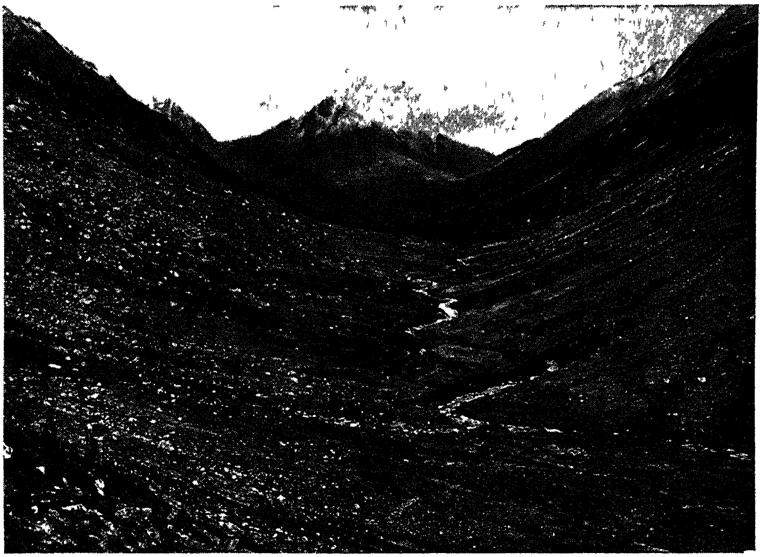
BEN VENUE AND LOCH ACHRAY IN THE SCOTTISH HIGHLANDS



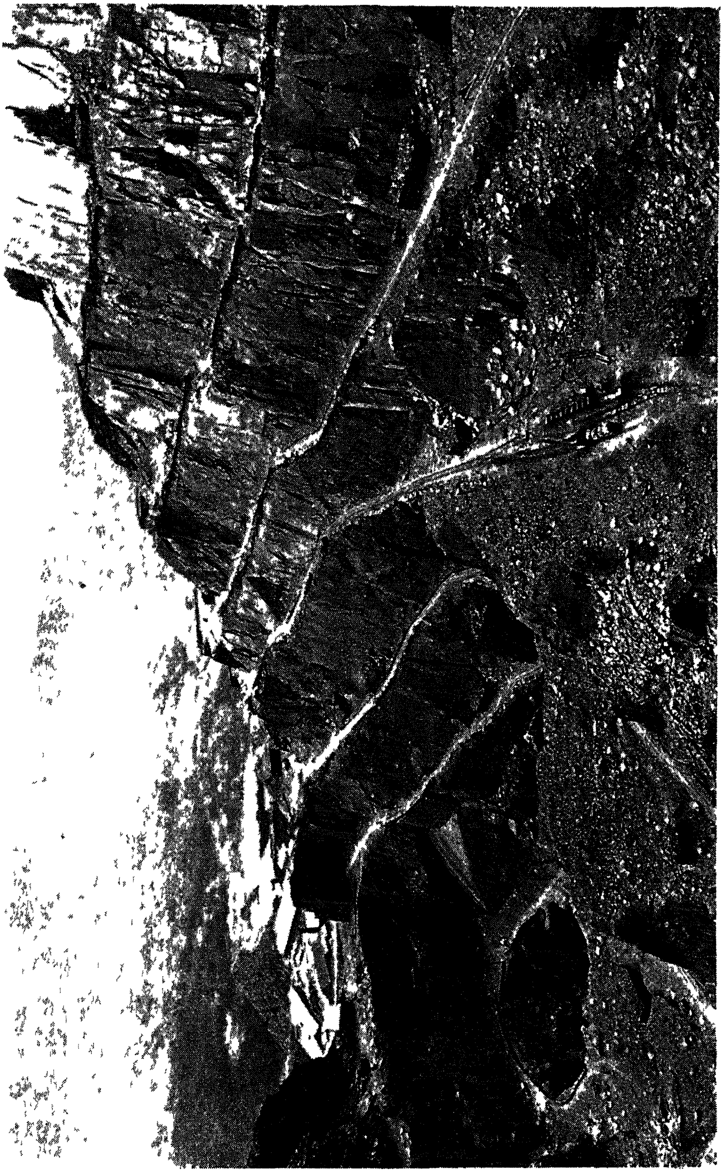
A GLEN IN SCOTLAND SCRAPED OUT BY GLACIERS

tumbling over a rocky waterfall and there flowing gently into a beautiful loch. Some of the glens were formed when this huge mass of hard rock cracked while the earth was settling down to its present shape. Other glens were scraped out by moving sheets of ice, or glaciers, in the days when this part of Britain was covered with ice and snow.

Since that time, millions of years ago, the streams, fed by the mountain rains, have carved a way between the mountains to the rugged Scottish coasts. In some of the glens the streams flow between pasture lands and ploughed fields, but most of the Highland farmers get a living from the flocks of sheep which feed on the short grass on the hill and mountain slopes.

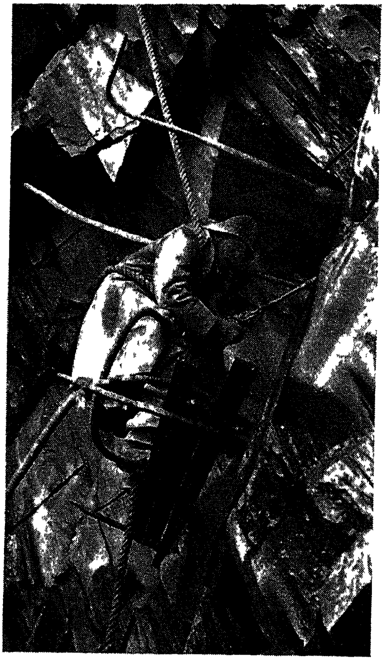
In the wilder parts of the Highlands it is much more difficult to get a living. The crofters, whose humble homes are often made of stone and thatch, eke out an existence mainly by growing oats or vegetables on their tiny farms, or crofts. If there is sufficient pasture at hand they may manage to rear a cow or two, and most of them keep sheep. Life for these sturdy Highlanders is very hard, and the crofter and his wife must do everything they can to win a livelihood for themselves and their children. Some of the women spin the wool of the sheep and weave cloth. The men, especially those of the lonely, rocky islands of the Hebrides, venture forth in their little boats to reap the harvest of the sea. Other crofters make a little money in the summer-time by acting as guides to the wealthy visitors who journey to the Highlands to shoot grouse or wild deer.

The dwellers of the Welsh Mountains also have a hard struggle to live. Although some of them still depend on sheep or cattle farms in the valleys, most of them have moved to the coalfields in the south of the country, just as the vast majority of Scottish people live in the Central Plain of Scotland, which is fertile and rich in coal. In the mountains of North Wales are extensive quarries. The workers, suspended



A SLATE QUARRY IN WALES

by chairs against the face of the solid rock, are busily engaged in boring and blasting the excellent slate which is exported from Wales to all parts of the world.



A SLATE QUARRYMAN AT WORK. HE IS USING A PNEUMATIC DRILL

So we see that the mountainous parts of our land are in the north and west. The south-east of Britain is occupied by lower, grassy hills, and flat plains crossed by gently-flowing streams.

Ireland does not seem to fit into the scheme, for in that island, although the highest mountains are also in the west, there are hills all round the coast, making us think of a saucer, high round the rim and flat in the middle. Much of this central plain of Ireland is bogland, holding water, because the clay beneath will not allow the rain to drain away.

Many of the bogs contain peat, which is cut out in chunks, stacked, and dried to be used as fuel in

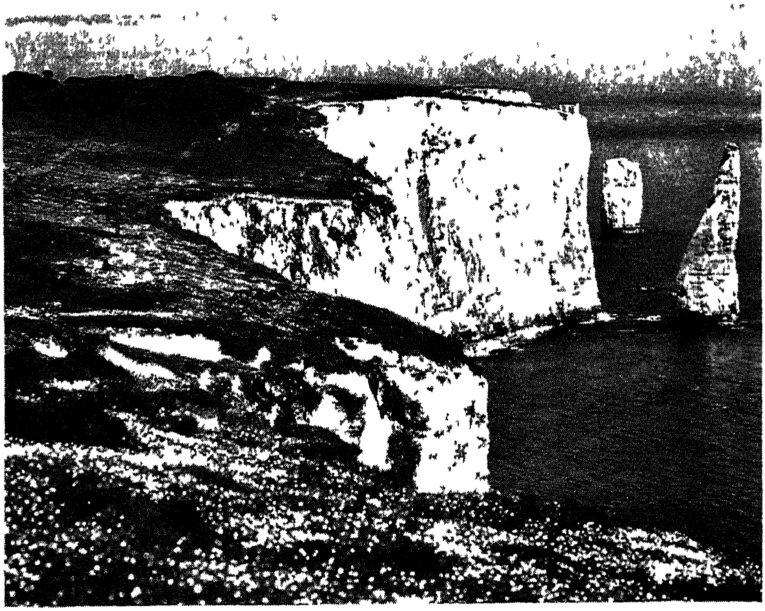
Irish households. The sight of a donkey-cart being loaded with peat is a common one in Ireland. The peat is cut from the flat, desolate plain which stretches away to the barren mountains in the distance, and then stacked to dry before being carted away for use.

Where the soil of Ireland is fertile, the trees and grass are fresh and green with the plentiful rain from the Atlantic, but most of the mountains are so unfertile that in recent years many people have ventured into the towns and left their humble highland dwellings to tumble into ruins.

There is a striking difference between the mountains and the hills of Britain. Not only are the mountains all found in the north and west, but they are in the form of huge masses or lumps, while the hills are arranged in ridges. The Highlands of Scotland make up one huge, solid mass of bold-looking heights. The hills of the south-east of Britain, however, lie like fingers spread out across the face of England.

The " hill fingers " of England begin in the same place, just as our fingers grow from a palm. The " palm " from which the ridges run is known as Salisbury Plain, a wide expanse of poor grassland with hardly any trees or bushes. Salisbury Plain is an enormous mass of chalk, thinly covered with soil, and from it run ridges of chalk hills far and wide.

The white cliffs of Flamborough Head, Dover,



CHALK CLIFFS ON THE COAST OF DORSET

Beachy Head, and the Isle of Wight, all mark the ends of chalk ridges which have crossed England from Salisbury Plain to the coast. In the dim ages of the past none of these cliffs existed, because Britain was then joined to Europe. The land sank and the sea flowed in to form what we call the North Sea and the English Channel. The chalk ridges were broken. Parts of them now lie beneath the sea-bed, and the cliffs of England and France remain to show us where the fractures occurred.

People love the scenery of Britain because it is so pleasantly varied. In the granite regions, like the Highlands of Scotland, we see grim, majestic mountains, while the chalk hills, being of softer rock, have been worn by the weather into rounded, grassy slopes, which are good pasture land for sheep. Between the hills are fertile valleys and plains, covered with cattle pasture, wheatfields, or orchards. On these lower lands, too, we find the great towns.

You will discover that the build of Britain not only explains the changing scenery of the country, but also the positions of the towns. The arrangement of the mountains also affects our climate and the routes followed by our roads and railways.

Only by studying such things can we understand how our Britain, so small in size, manages to play such an important part in the world and its affairs.

## QUESTIONS

1 Say why you think Britain has a good position for trade.

2 Describe the life of the crofters

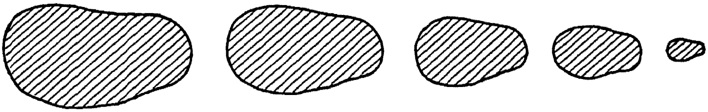
3 What do you know about the " hill-fingers " of England?

## EXERCISES

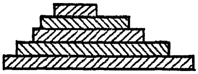
1. (Use your map.) Find and write down the names of the hills in the ridges that run from Salisbury Plain:
    - (*a*) to Flamborough Head, through East Anglia;
    - (*b*) to Dover,
    - (*c*) to Beachy Head.
2. Write down the name and the height of the highest mountain you can find in (*a*) the Welsh mountains, (*b*) the Cumbrian mountains, (*c*) the Pennines, (*d*) the Grampians, and (*e*) the mountains of Ireland.
3. Using the scale of the map, find the distance from London to Glasgow, from London to Cardiff, and from Belfast to Cork.

## CONTOUR LINES AND SECTIONS

1. Cut out some pieces of thick cardboard, all roughly the same shape, but getting smaller each time.



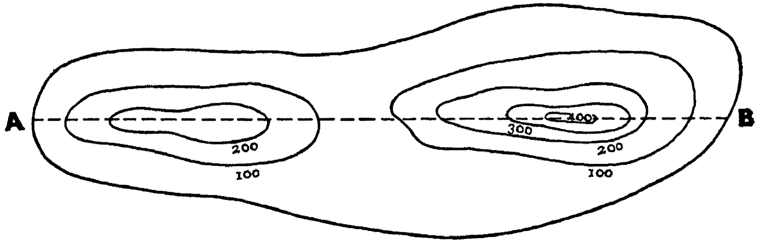
Build them up on the largest one so as to make a hill Paste them together if you can.



You have now made a hill, with lines, marked by the edges of the cardboard, running round the side of it. The lines are all the same height above one another. A line running round a hill or mountain at the same distance above sea-level is called a contour line.

The lines on your cardboard model are very close together, but if you were dealing with a real hill, say 400 feet high, your contour lines would be 100 feet above one another.

2. Make a clay model of a hill 2 inches in height, and let the model represent a real hill 400 feet high. Scratch round the hill lines to show increases of 100 feet in height. What distance on your ruler represents a height of 100 feet?
3. Draw the contour map of an imaginary island with a high peak in the north-west corner.
4. You can now cut out cardboard shapes and build up two hills of different heights with a valley between.



Make a clay model of this, using the same scale as before, and scratch the contour lines to show heights of 100 feet

If you walked from A to B, draw a diagram in your note-book to indicate how you would go up and down hill.

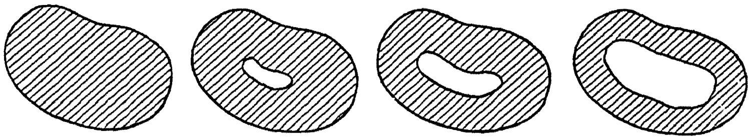
Can you see which would be the easiest route for walking from A to B?

If you look at your atlas you will find the contour lines marked by thin black lines, or by different thicknesses of shading, the darker colours showing where the hills are highest Look at a contour map of the north of England and draw a line in your notebook to show how the land rises and falls between Liverpool and York

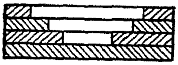
### 5 *Depths of Lakes and Seas*

We also show equal depths of water by means of lines

Cut out pieces of cardboard all the same size and shape, but with larger and larger holes in the centre.



Build them up on the first one to represent a lake.



Make a model of this lake in clay and scratch depth lines on the side of the clay. (Remember that, in numbering the lines, you commence *from the top.*)

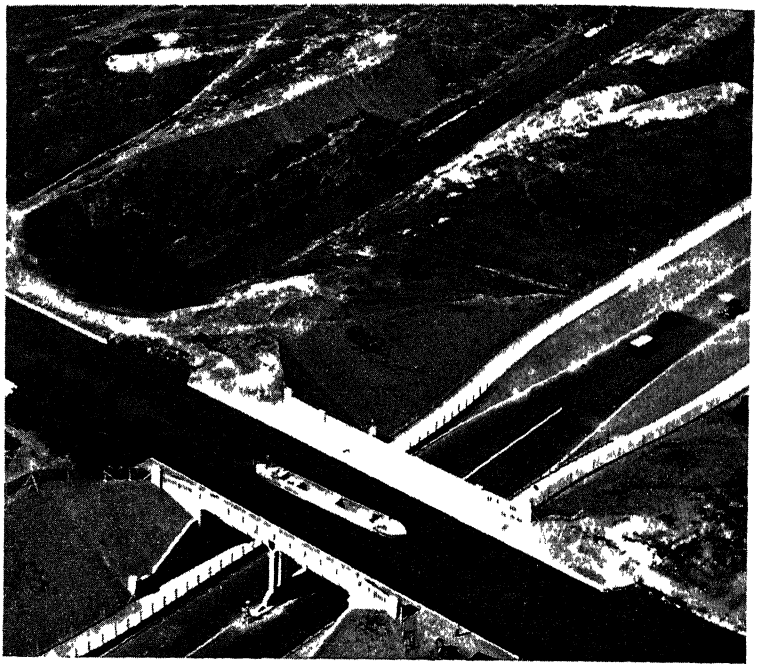
Look at a map of any ocean which has the deep parts shaded on it, and draw the ups and downs you would find if you could travel on the bottom of the ocean from shore to shore. (Remember that the heavily shaded areas are the *deepest* parts.)

## CHAPTER 2

# TWO RAILWAY JOURNEYS ACROSS BRITAIN

We are about to make a journey of discovery of just over 400 miles across three countries — England, Wales, and Ireland. We begin our trip amid the noise and smoke of London, but we shall end it among the fresh green beauty of Killarney. When we have made this journey we shall return to London for another trip northwards into Scotland. Only by watching the changing scene with our own eyes can we learn what a busy and wonderful land this Britain of ours really is.

Here we are, then, seated at the window of a Great Western Railway train which is just drawing out of Paddington Station. For about six miles we see little except the back gardens of houses in the western suburbs of London, but the country then grows more open and pleasant. We even see a few old farmsteads, and then we pass over the Grand Union Canal to catch a fleeting glimpse of ducks, side by side with barges on the placid water. We must not be misled by the sleepy appearance of this



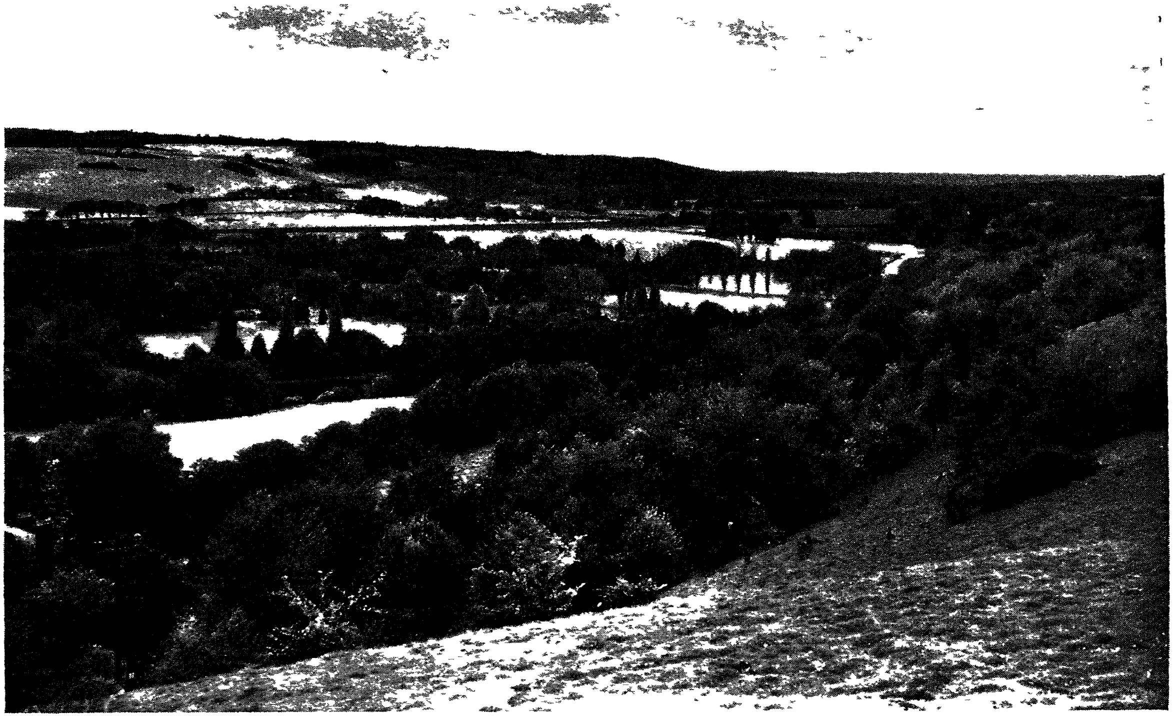
WHERE THE GRAND UNION CANAL CROSSES OVER THE NORTH CIRCULAR ROAD NEAR WEMBLEY

canal, because it is actually a very important trade route connecting London with the busy Midlands. Where we pass over it, we are very near the Brentford docks, which mark the London terminus of the canal.

Continuing our journey along the Thames valley, we see Windsor Castle, with its long array of towers and battlements surmounted by the great Round Tower. We are now well clear of London, and here and there we see cows lazily at grass in the sunny fields. This scenery of lush meadowland dotted with old churches and picturesque villages is typical of England, and we should see very much the same views, no matter in which direction we journeyed outwards from London.

After following the course of the winding Thames for another twenty miles, we notice that the river has drawn close to us on our right, and for the next ten miles or so we shall follow it very closely, because both railway and river use the gap that the river has made through the ridge of chalk hills. First passing through Reading, where we get close views of large biscuit factories, we notice that the meadow-land on either side of the track rises in the distance to form hilly country. The hills on our right are the Chilterns, those on our left the Marlborough Downs, and it is quite plain that the railway is passing through the gap between the ends of these two ranges. All round London are similar gaps worn by rivers through the chalk ridges, and the railway builders have made good use of the openings as the easiest way of crossing the chalk "fingers" which lie to the north, west, and south of London.

As we travel westwards between the grassy, rounded hills, the sight of a huge white horse cut in the turf on a hillside is the only visible sign that the



THE STREATLEY-GORING GAP IN THE THAMES VALLEY CAN YOU SEE THE RAILWAY LINE?

land here is composed mainly of chalk. We are now in the Vale of the White Horse, and if we could inspect the carving which gave the valley its name, we should find that the picture of the horse has been made by the removal of the top three-foot layer of earth, leaving exposed the white chalk beneath. The carving is believed to be over a thousand years old. Other smaller horses have been carved on these chalk hills, their whiteness revealing the chalky composition of the hill ranges of south-eastern England.

The town of Swindon seems out of place in the midst of all these smiling pasture-lands. Swindon is a "railway town". We pass its great locomotive works and catch fleeting glimpses of newly-painted tenders, or of engines in various stages of construction.

A few miles after passing between the chalk ridges we approach a fresh range of hills — the limestone Cotswolds. We cross the winding Avon, where it is hardly more than a brook, and marvel to think what a fine river it makes when, swollen with the drainage of the Cotswolds, it flows through Bristol and on into the Severn estuary. We actually pass right through one of the outlying hills of the Cotswold range, for not far from Bristol the train travels through a four-mile tunnel, cut in the solid limestone. This underground journey is almost as long as the great Severn Tunnel itself, by which we pass under the estuary of the River Severn to emerge in Monmouthshire.

Travelling across the river valleys which flow down from the mighty Welsh mountains, we speed through the busy towns of South Wales — Newport, Cardiff, Bridgend, Aberavon, Swansea — and see sights far different from those afforded by our run across agricultural England. Blazing furnaces pouring out smoke and flame; giant chimney stacks towering through the murky atmosphere; tinplate works throbbing with the noise of machinery; extensive docks where the "coal tips" raise 20-ton trucks and tilt them so that their load of coal goes scurrying into the hold of a ship: all these are signs that we are crossing one of the richest coal areas in Britain.

Beyond Swansea we see more of the natural beauty of Wales — the hills sloping down abruptly to a narrow strip of saltmarsh or sand dunes bordering the sea, steep-sided valleys, and old picturesque castles — and then our train runs alongside the quay in Fishguard Harbour. We have crossed England and Wales!

Boarding a fast and powerful turbine steamer, we cross St. George's Channel to Rosslare in Ireland, where we take train again, and are back once more among scenes of rural beauty. We are in a land of lovely rivers. We cross the broad Barrow and run

COTTAGES IN WESTERN IRELAND NOTICE THE STACKS OF PEAT

for many miles alongside the placid Suir. Later, we view the beautiful reaches of the Blackwater, and towards the end of our journey marvel at the turbulent mountain torrents tumbling down rocky slopes in cascades and waterfalls. We notice, also, the grand mountains, especially those near Killarney, the humble white-washed cottages, wandering donkeys and goats, stacks of peat for burning, and children who run about bare-footed.

Although we pass through the fairly large port of Waterford, it is plain that Ireland is a more pastoral country than England and Wales, claiming our attention more by its scenery than by its industry. We notice the grey mists hanging over the mountains of Kerry, and we remember that we are now on the wet side of Britain, where the west winds from the Atlantic drop their moisture as they pass eastwards towards England.

Our northward rail journey from London is similar in many ways to our run westwards. We leave Euston Station, and once through the suburbs of London are in the gentle, rural surroundings of south-eastern England.

As before, we cross the chalk ridge through a gap, and then the limestone ridge by means of a tunnel. We are soon at the important midland junction of Rugby, from which railways radiate in almost all directions. Just before running into Rugby we get a good view of the great wireless station used for the Trans-Atlantic telephone service between Britain and the United States. We see the aerial, three miles long, supported by twelve masts spaced at quarter-mile intervals.

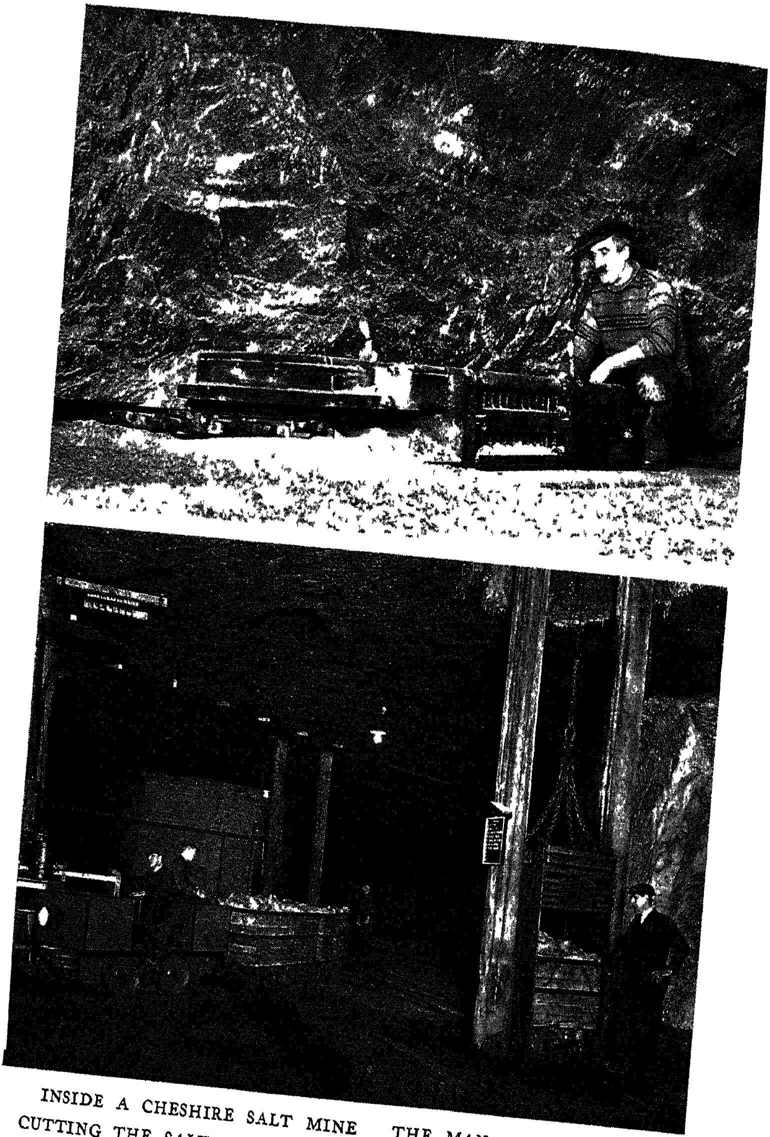
From Rugby our way takes us between the Pennines and the mountains of Wales. We now begin our journey across the coalfields that lie near the Pennine Chain, and we are therefore not surprised that every here and there signs of industrial activity meet our gaze. We flash past stone quarries, brick-works, and pumping stations which raise water at the rate of thousands of gallons a minute for use in the potteries of Staffordshire.

Our first stop after Rugby is Crewe, the huge "railway town" with locomotive works that cover a hundred and sixty acres. The railway branches at Crewe, one line going westward to Holyhead, along the narrow coastal plain which fringes the mighty mountains of North Wales.

We continue on the main line from Crewe, and soon see abundant evidence that we are in the industrial north of England. After crossing the saltfield of Cheshire, we pass over the busy Manchester Ship Canal to catch sight of a distant vista of pithead gears on the Lancashire coalfield.

We pass spinning-mills, blast furnaces, and crowded towns. We see tall factory chimneys even at Lancaster, where the railway begins a journey famous for its scenery of mountains and lakes. As we travel through the valleys of the rivers Lune and Eden we see the Pennine range on our right and the wide panorama of Lakeland hills on our left. A few miles beyond Carlisle we glide at about fifty miles per hour over the Border into Scotland.

On this short journey from Carlisle to Glasgow we receive two quite different impressions of the



INSIDE A CHESHIRE SALT MINE  THE MAN AT THE TOP IS CUTTING THE SALT FROM THE ROCK  BELOW IS AN ELECTRICALLY-DRIVEN TRAIN LOADED WITH SALT country. The beautiful fertile country of Annandale gives place at last to the outskirts of busy Glasgow. Once again we speed past mile after mile of coalfield scenes — works for making iron and steel, rolling stock, cranes, girders for bridges, steel roofs, with a cluster of blast furnaces here and there, or a pottery, or a brickworks, or a stone quarry, and so into the heart of Glasgow, the second largest city in Britain, throbbing with the industry of the Central Plain of Scotland.

If time permitted we could continue our journey northwards through the noble mountain scenery of the Scottish Highlands.

On the two trips we have made, however, we have seen our land in both restful and busy moods, and have seen that all parts of the land are linked by innumerable trade-paths — roads, rivers, railways, and canals — which are used day after day for transporting the people and goods of busy Britain.

## QUESTIONS

1 How did we cross the chalk and the limestone ridges on each of our two journeys?

2. During our travels, what impressions did we gather of South Wales, Ireland, and Scotland?

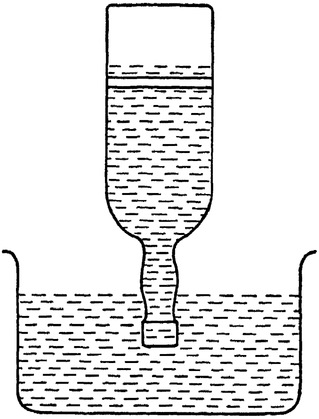
## EXERCISES

1. Make a map of the two journeys described in the chapter.
2. Draw a map of South-east England showing the railways from London that pass through the following "gap" towns. Hitchin, Luton, Aylesbury, High Wycombe, Reading, Guildford, and Sevenoaks.
3. Write down the names of the towns on the L N E.R. route from London, through York and Edinburgh, to Aberdeen.
4. Collect pictures of well-known railway engines, like those which draw the "Coronation Scot" and the "Cheltenham Flyer". Paste them in your notebook and write under each one the company to which it belongs, and the chief stations along its route.

## MAKING AND READING A BAROMETER

The barometer is an instrument which is used for measuring the weight, or pressure, of the air. It is a very useful instrument in weather forecasting, because dry air, very strangely, weighs more than moist air. When, therefore, the barometer shows that the air is heavy, we expect dry weather, but when the barometer shows that the air is light, we expect rainy weather.

You can make a rough barometer of your own with a bottle and a jar. Fill the bottle with water (coloured with a little red ink), close the mouth of the bottle with your fingers and invert it in a jar. Allow some of the water to flow out into the jar so that there are 2 or 3 inches of air in the bottle. The air pressing on the surface of the water in the jar prevents the rest of the water from flowing out of the bottle. When the air pressure increases, the level of the water in the bottle will rise, and you can expect fine weather. You will, of course, have to make a wooden stand to hold the bottle in place.



A ROUGH BAROMETER — STAND NOT SHOWN. THE DOUBLE LINE ON THE BOTTLF MARKS NORMAL LEVEL

You can make your rough barometer more useful by comparing it, for a few days, with the school barometer, which will rise and fall much more noticeably than your rough instrument, because it has no air to prevent the liquid moving. When the school barometer stands at "Normal level" (30 inches) cut a strip of paper about $\frac{1}{8}$ in. wide, print the words "Normal level" on it, and stick it on the bottle just where the level of water is. This will make it easier for you to see when your barometer rises above or falls below the normal.

Make the following table in your note-book and enter your readings (of the school barometer) every day for a month.

| Date | Height of Barometer | Weather (wet or dry) |
|---|---|---|
| | | |

## CHAPTER 3

# OUR WEATHER AND CROPS

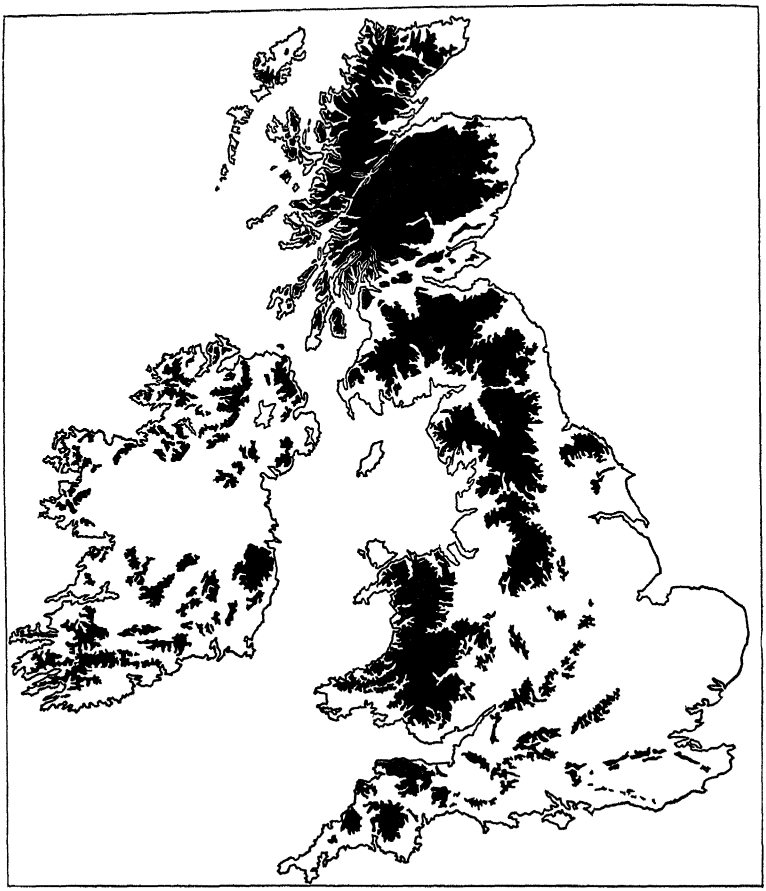
When you were young, you learned a nursery rhyme which said: "The north wind doth blow and we shall have snow". Since those days of nursery rhymes you have discovered, by making wind charts, that winds have a great effect on the climate of a country. If the wind blows from an ocean we expect it to be a wet wind and to bring rain. If the wind blows from a cold area, such as the Polar regions, we expect it to be a cold wind, and to bring snow. We find, as a rule, that this really does happen.

The people who live among the mountains in the west of our islands are very used to rainy weather. It is easy to see from a rainfall map that the rain is brought by the west or south-west wind, which has collected moisture on its long journey over the Atlantic. It so happens that the wind which blows most often over our land is this wet west wind from the ocean. On an average, the west or south-west wind blows in our country one day out of every two. These rain-bearing winds, as they rise to blow over our mountains, become cooler, dropping most of their moisture before they reach the lower, eastern plains of Britain. The farmer of East Anglia often complains about drought, because the winds from the west are dry by the time they reach the part of Britain where he lives. The easterly winds cannot come to the rescue of his crops because they do not blow over a very wide expanse of sea before reaching Britain.

Our country would not be such a "green and pleasant land" if the west wind did not blow as frequently as it does, nor would Britain be so warm as it is — especially in winter. For although Britain is in the temperate belt, many countries which are the same distance from the Equator have much more bitter winters than we experience. The west winds bring us not only rain, but warmth.

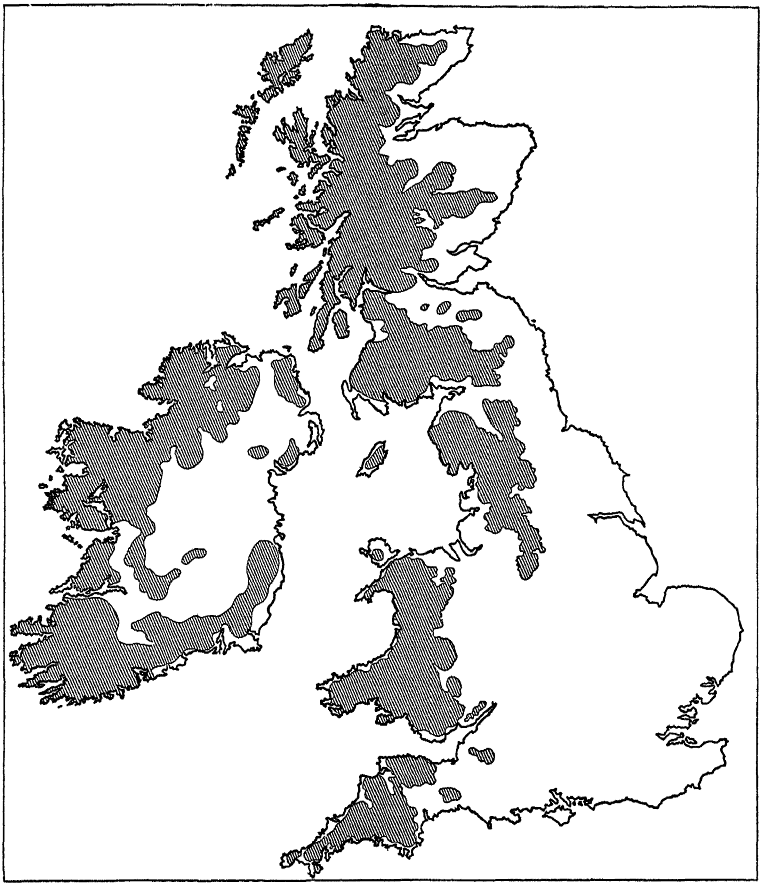
The reason for this is the wonderful way in which the ocean holds its heat from the sun after the land has cooled down. In winter, therefore, the Atlantic is warmer than the lands of Britain, and so the winds from the ocean are warm winds, and make our winters less severe.

It seems strange that in the summer the westerly winds have the opposite effect, and help to keep our land cool. The ocean takes longer to warm up than the land does, and in the summer months the winds from the Atlantic are cooling winds. It is quite plain



PHYSICAL MAP OF THE BRITISH ISLES LAND OVER 500 FT IS SHADED BLACK

that we owe much to the Atlantic. It not only provides Britain with regular rainfall, but it also cools our land in summer, and warms it in winter. It is the temperate climate and regular rainfall which



RAINFALL MAP OF THE BRITISH ISLES SHADED PARTS HAVE OVER 40 INCHES OF RAIN YEARLY

make Britain the fresh green land we found it to be when we travelled across it by rail.

We found that the scenery varied in a most entrancing way, and you will not need to be told that the changing of the scene was due to differences in the climate and soil. These differences, as you would expect, also determine what crops can be grown in the various parts of the land.

Even the pasture lands of wet, westerly Britain are richer than those of the dry east. Ireland rears many more cattle than any other part of Britain for this very reason. In order to produce milk, cattle need pastures of long grass, and it is only where rain is plentiful, as in Ireland, that long, luscious grass can grow. Sheep can survive where grass is shorter and scarcer, and the sight of sheep on the downlands of England is as common as the sight of cattle grazing in the meadows of Ireland.

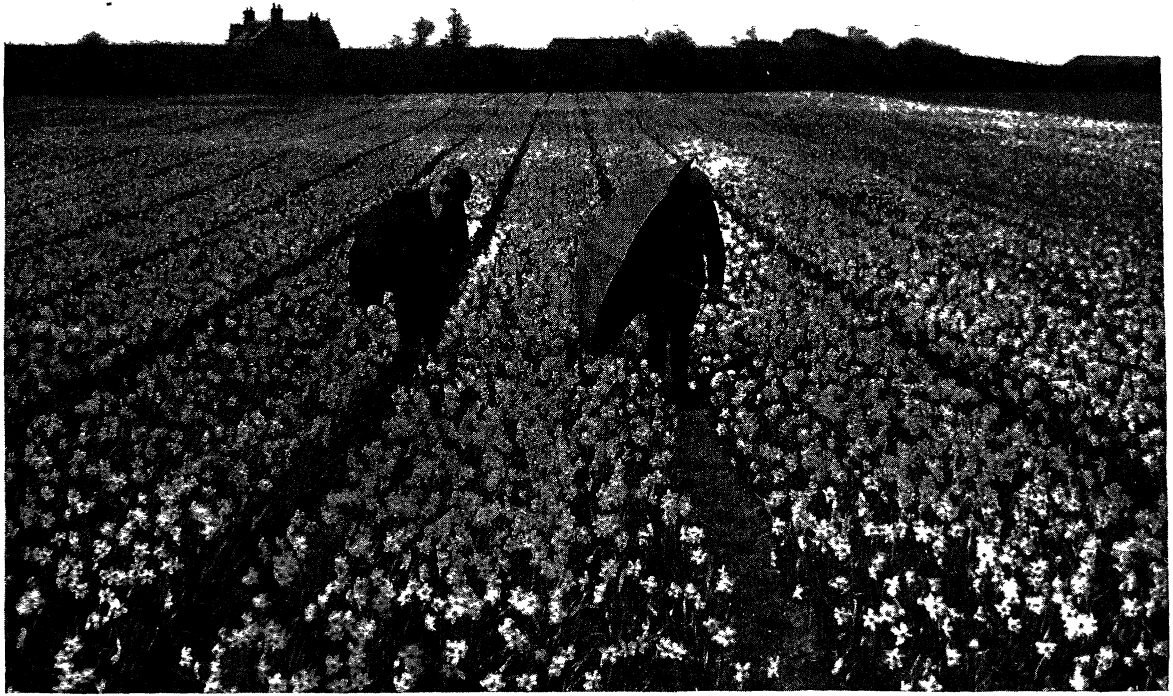
Cattle also need much more water to drink than sheep do. In the wetter lands of the west the rivers and streams are so numerous that cows are never far from a good water-supply. We often find sheep far away from water, up on a hillside, or even on the very top of a down, where cattle could not survive. It is true that on the English downs there are dew-ponds here and there — those wonderful, man-made ponds which contain the water of condensed dew, even in the driest weather. But such a water-supply would be, by itself, far too scanty for cows. Cattle are certainly reared in England and in large numbers, but mainly in such rainy, westerly parts as the Devonshire valleys. Devonshire is famous for cream and butter, and Ireland, too, exports much butter. This is all because these two places receive sufficient rain to make good cattle pastures.

Many other differences are to be found between the crops of the wet west and those of the dry east. In Ireland there are many fields of oats, but few of wheat. In England, especially in the east, the reverse is the case. Oats is a cereal, or grain crop, which can grow well in a damp climate with a lack of sun. Wheat is a more delicate plant, and will ripen well only in dry, sunny weather, such as East Anglia generally has in the summer months.

We should really expect to find the differences we have already noticed — the cattle meadows and oatfields in the west contrasting with the sheep pastures and wheatfields in the east. We should note, however, that the contrasts do not always hold true; the mountain regions of western Scotland and of Wales feed thousands of sheep of hardy breeds that can endure the wet climate.

Besides these main differences, we find that many areas have a particular and rather unexpected crop for which their climate and soil happen to be very suitable.

Ireland, for example, grows large quantities of potatoes and flax. Both of these crops grow well in



BULB GROWING IN LINCOLNSHIRE THE MEN ARE LOOKING FOR DISEASE AMONG THE PLANTS, AND ARE SHADING THEM FROM THE SUN SO THAT SIGNS OF DISEASE MAY BE MORE CLEARLY SEEN the wet, mild weather of the west, and the ponds and streams of Ireland are very suitable for " retting " or soaking the flax stalks before they are split into the fibres which make the world-famous Irish linen.

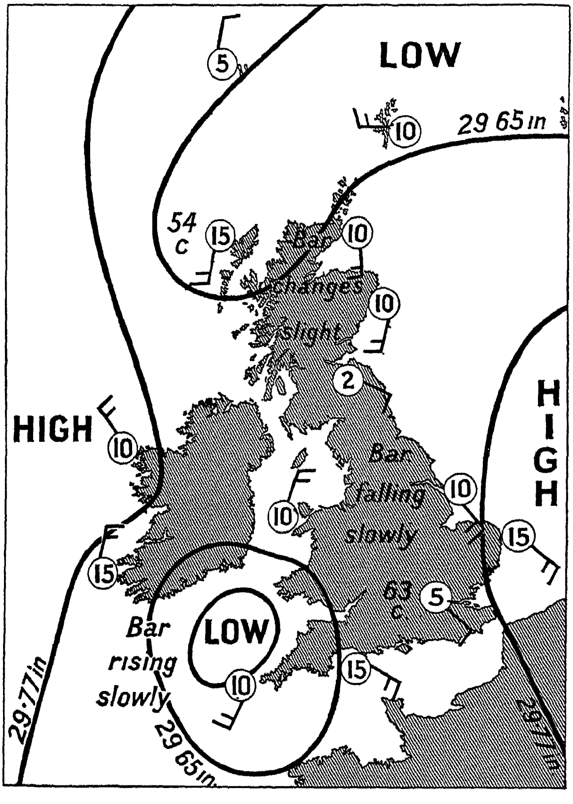
In the far east of England, especially in Lincolnshire, we see the wide flat fields ablaze in the spring with flowering bulbs, reminding us of Holland.

Then, here and there, we get a real surprise. We should not expect to find fruit growing in the colder, northerly parts of Britain. Yet in the Carse of Gowrie in Scotland there are fine fruit fields, where raspberries, especially, grow in profusion. There is always some explanation of an exceptional case like this, and we soon notice that the Carse of Gowrie is protected by the Sidlaw Hills, which act as a shield against the cold north winds.

Now that we have an idea of the weather and the build of our land, we shall be able to understand better the reasons for the different kinds of work that men and women do in various parts of Britain.

## QUESTIONS

1. What benefits do we receive from the Atlantic winds?
2. What are the chief differences between the crops and animals of the west and of the east of Britain?
3. What do you notice when you compare the maps on pages 42 and 43?



## READING A WEATHER CHART

1. Which part of Britain, according to the chart on p. 48, is having the driest weather?
2. Which part is having the wettest?
3. Over which part is the strongest wind blowing? (The speed of the wind, in miles per hour, is shown by the numbers in circles, and also by the number of "tails".)
4. From which direction is the strongest wind blowing? (The direction of the wind is shown by the straight line pointing to the circle.)
5. Which part of the land is soon likely to have better weather?
6. Which part is soon likely to have worse weather?
7. What is the direction of the wind blowing over London, Edinburgh, and Donegal?
8. Look at the barometer readings and then at the wind arrows. Do you notice any connection between the air pressures and the direction in which the wind blows?

## EXERCISE

Draw a rough map of Britain and shade the parts that have the heaviest rainfall (see rainfall map on p. 43). Draw a thick arrow over the sea to show the direction of the wind which brings most rain.

A TYPICAL PIT-HEAD SCENE

## CHAPTER 4

# A VISIT TO A COALFIELD

Although machines of all kinds have now been invented to quicken work in a coal-mine, there are still hundreds of thousands of men in Britain who go down into the earth to cut coal. We are going to visit an up-to-date coal-mine, and for a time we shall share the risks which surround the miners at their work.

We must be up very early, because the men on the "morning shift" start work before six o'clock. As we mingle with the crowd of miners, and walk towards the colliery, we notice that the workers' clothing is cleaner than we should expect. Just outside the colliery gates is a large yellow brick building, and when we see what goes on inside it, we understand how it is that the miners can manage to go to and from work in clean clothing. The yellow building is called the Pit-head Baths. Before descending the mine each man changes into his dirty working clothes, and, after work, has a bath and dons his clean clothes again, before returning home.

After having changed clothes on their arrival at work, the miners file past the "lamp cabin", where each receives his own electric lamp. The lamps are handled and tended with great care, for much depends on their efficient working underground. From the lamp cabin we walk with the miners to the top of the shaft and enter the cage for our journey into the bowels of the earth.

We just have time to notice that the cage has two decks, each large enough to hold about twenty men, when a bell clangs noisily. A few seconds later we feel ourselves dropping, faster and faster, and experience such a queer sensation that we feel as though we are travelling upwards instead of downwards.

Very soon we feel a slight bump, and know that we have reached the Pit Bottom.

Stepping out of the cage, we see men who are waiting to be taken to the surface. These are the "stone-men", who have been working all night, blasting and cutting their way slowly and carefully through the rock to make new roadways and levels. In spite of the grey rock-dust which covers their clothes, they are very happy, looking forward to their breakfast and a well-earned rest.

The miners who descended the shaft with us are being searched for matches, or anything else which could ignite the gas in the mine and cause an explosion. While the men are being searched we have time to look about us at the strange world into which we have come. The Pit Bottom looks like a railway junction at night, for it is a large space, lit brightly by electricity, and railway lines run from it into the tunnels, or levels, which branch out in all directions. The roof of this underground hall is supported by wooden pit props and steel girders.

The miners are now making for their working places along the different levels, which are lighted only for a short way from the Pit Bottom. Some of the men have to walk miles along the levels before starting work, and as they pass beyond the lighted section of the tunnel we lose all sight of them except

MINERS AT WORK IN A "STALL". NOTICE THE PROP ON THE RIGHT OF THE PICTURE

for their lights, which move to and fro as the men thread their way through the inky blackness.

Accompanied by a guide, we journey along one of the tunnels. Presently we hear a faint rumble which grows louder and louder each second. Our guide tells us to stand near the wall. Along rattles a line of small iron waggons, called tubs, each of which holds approximately a ton of coal, and is propelled by an electrically-driven overhead rope to which it is attached by chains. Several times we have to stand aside, while a train of tubs clatters by with a load of coal for the Pit Bottom, or returns empty to the workings.

On our journey through the tunnel we come, every now and then, to a " stall ", which is a division of the workings where the same men work each day. Underground work is very hot, and we notice that the men are stripped to the waist. Some of them are cutting the coal, either with a pick or a cutting-machine, others are loading the coal into the waiting tubs, while yet another gang are measuring and cutting props to support the roof where the coal has just been cut away.

When all the tubs are filled, the number of the stall is chalked on them, they are connected to the overhead ropes, and off they go on a dark journey to the Pit Bottom. When the tubs are weighed on the weighbridge at the surface, the weight of the coal is entered up under the number of the stall from which it has come.

Retracing our steps to the Pit Bottom we see the " onsetters " loading full tubs on to the cages. These men are fully dressed, because they work near the bottom of the draughty shaft. We are soon up in the bright and cheerful daylight once more, seeing what happens to the coal that is brought to the surface. We see the " banksmen " pulling the loaded tubs off the cage and running them on to rails. The tubs are then pushed on to the weighbridge, and from there to the " screens ", which are like giant sieves. The

A PIT PONY DRAWING A LINE OF TUBS THROUGH A MINE GALLERY

tub is first run into a " tippler ", which tips the coal on to a shaker, a metal sheet perforated with holes about five inches in diameter. The shaker clatters loudly as it works with a to-and-fro motion, and the smaller pieces of coal, called cobbles, fall through the holes, while the large pieces remain on the top. There are actually a series of " shakes ", one above the other, which separate the coal into various sizes, from large lumps to " slack ". The coal is put on travelling belts which pass in front of a row of boys whose work is to pick out any pieces of stone and slate. The coal is then ready to be dispatched by railway or barges to factories, shops, and homes.

Some of the coal is used for making gas, and it is only when we visit a gas-works that we discover how really wonderful this precious black rock really is. When the coal is roasted in the gas-works, not only is gas produced for lighting and heating, but the coal is made to yield artificial manures, like sulphate of ammonia, disinfectants, such as carbolic acid, light oils like benzol and creosote, heavy lubricating oils, tar, and other substances from which dyes, drugs, and explosives are made. Even the residue of coke in the retorts is used on domestic fires, or, in much larger quantities, in the blast furnaces of the iron-making districts.

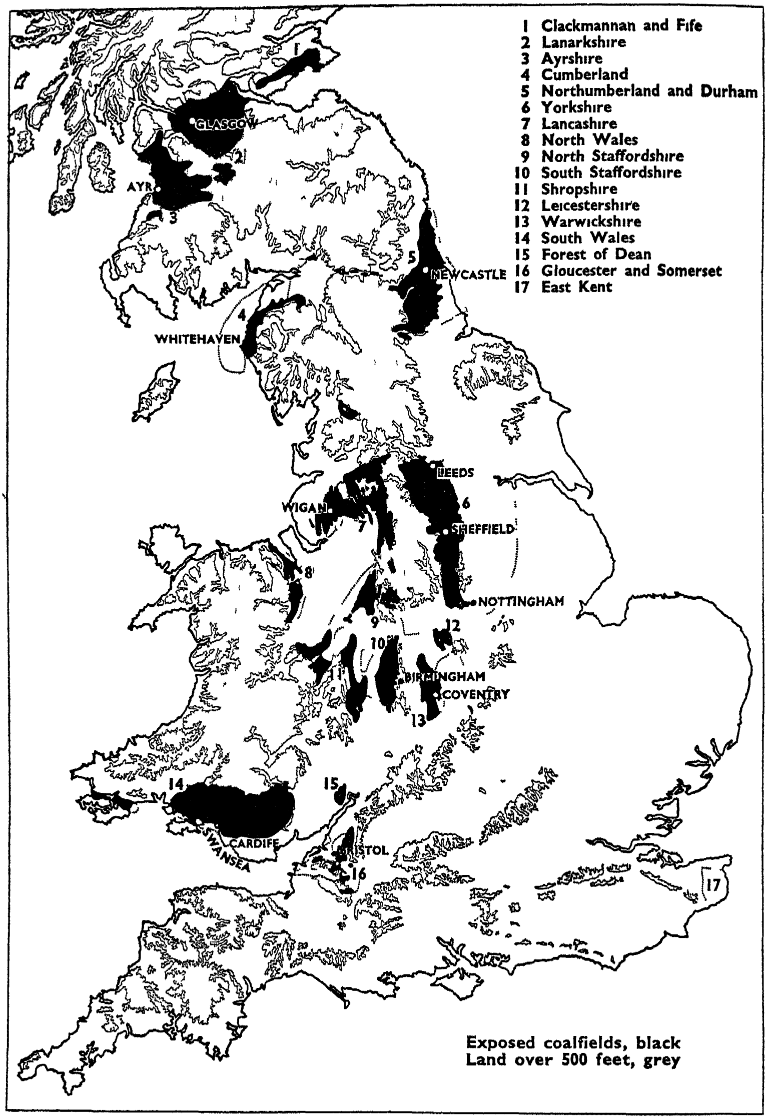
As we tour a big gas-works, and pass from one plant to another, to find each producing a different by-product of coal, we are left with no doubt whatever that coal really does deserve the name of "Black Diamonds". We are brought to realize, also, how wasteful it is to burn coal in our fireplaces, allowing its useful by-products to be destroyed in flames. Because of this, more coal every year is being treated so that certain substances are extracted from it before it is used as fuel.

Besides being important for what it yields, coal is also valuable for what it does. It provides the fuel used in making the steam and electricity which drive the machinery of our factories and the engines of our locomotives and ships.

Britain is very fortunate in having such a plentiful supply of coal. Countless ages ago large tracts of our land were covered with dense forests, but as the earth cooled down to its present shape, its surface crumpled, and many of the forest areas became submerged beneath thick folds of the earth's crust. In the course of the millions of years that have passed since then, the pressure of the upper layers has converted the wood into coal.

Most of our coalfields lie near the edges of our mountain masses. The Scottish coal areas are in the Central Plain which borders the Southern Highlands. The English coalfields, with the exception of the small one in Kent, lie around the Pennine Chain, while in Wales the coalfields are found on the coastal plain to the south of the Welsh mountains.

Some coal areas produce coal which is used for a special purpose. South Wales, for example, is the chief source of " smokeless coal " or anthracite, which is used for furnaces and ships. The " house " coal of Derbyshire, as the name suggests, is used mainly for the household fires of Britain, while some coalfields, like those of Fife in Scotland and of Northumberland



THE COALFIELDS OF BRITAIN

in England, export large quantities of coal to foreign countries.

On every coalfield, furthermore, industries have developed which depend on the coalfield for supplying their factories with power. From the coal of Yorkshire is derived the power that drives the looms in the woollen mills. On the other side of the Pennines the coal drives the cotton-weaving machinery of Lancashire. The ships of the Clyde are built with the help of coal from Lanarkshire, and the coal of South Wales burns in the furnaces which are used in the tin-plate industry. The potteries and other factories of the Black Country depend on the coalfields of the Midlands.

So we could journey from one coalfield to another, to find that the coal which emerges from the shaft-tops gives life to industry after industry. It becomes quite obvious to us that nothing has a greater effect on the lives and work of our people than the " Black Diamonds " won for us from the depths of the earth by the bravery and hard work of the coal miners.

## QUESTIONS

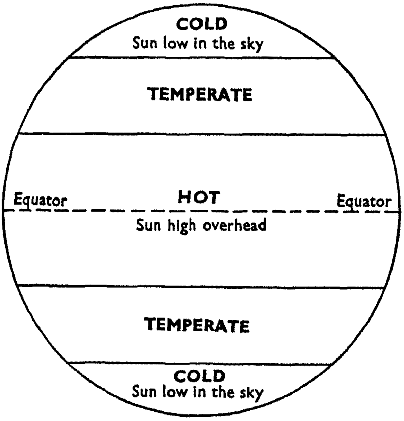
1. Name three British industries which rely on coal.
2. Name the by-products obtained when coal is heated to make gas.

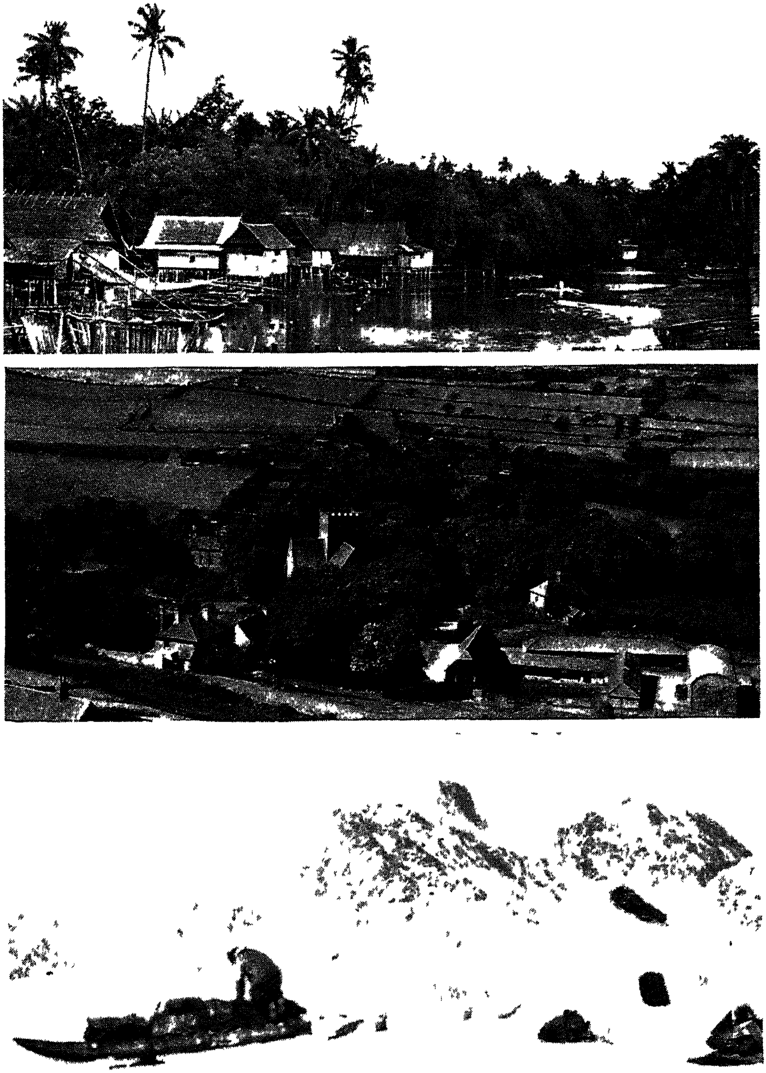
## EXERCISES

1. (Use the map on p. 58.) Make a list of the British coalfields, and write opposite each the industries carried on on the coalfield.
2. In a recent year, the U.S.A., Great Britain, and Germany produced about 300, 200, and 100 million tons of coal respectively. Draw three rectangles, to the same scale, to compare the amounts of coal produced by these three countries.

## CLIMATIC ZONES

The three pictures on the opposite page present scenes in the tropical, temperate, and frigid zones. Differences in vegetation are caused mainly by differences in temperature and rainfall. Which of the three zones do you think has the heaviest rainfall and the highest temperature?





SCENES IN THE TROPICAL (TOP), TEMPERATE (CENTRE), AND FRIGID (BOTTOM) ZONES

### *Exercises*

Copy the diagram on p. 60 (about 4 inches in diameter), showing the main climatic zones of the world. The names of the belts are. North Temperate, South Frigid, Equatorial (or Tropical), North Frigid, South Temperate. Print the names of the zones in the correct belts

Print the following items in the zone to which you think each refers.

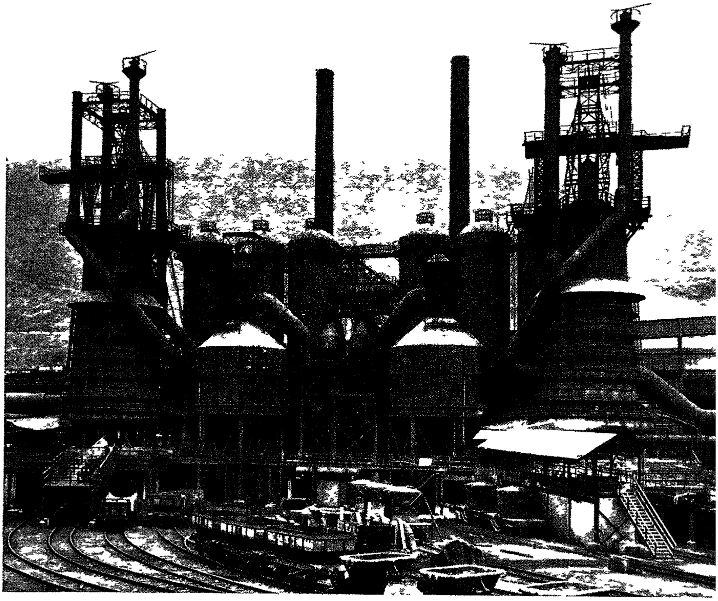
Britain, India, Lapland, reindeer, lion, sheep; moss, oak, teak, annual rainfall over 8 inches, annual rainfall 3 inches, summer temperature 60° F, summer temperature 40° F, summer temperature 80° F.; brick houses, snow-huts, tree-houses.

## CHAPTER 5

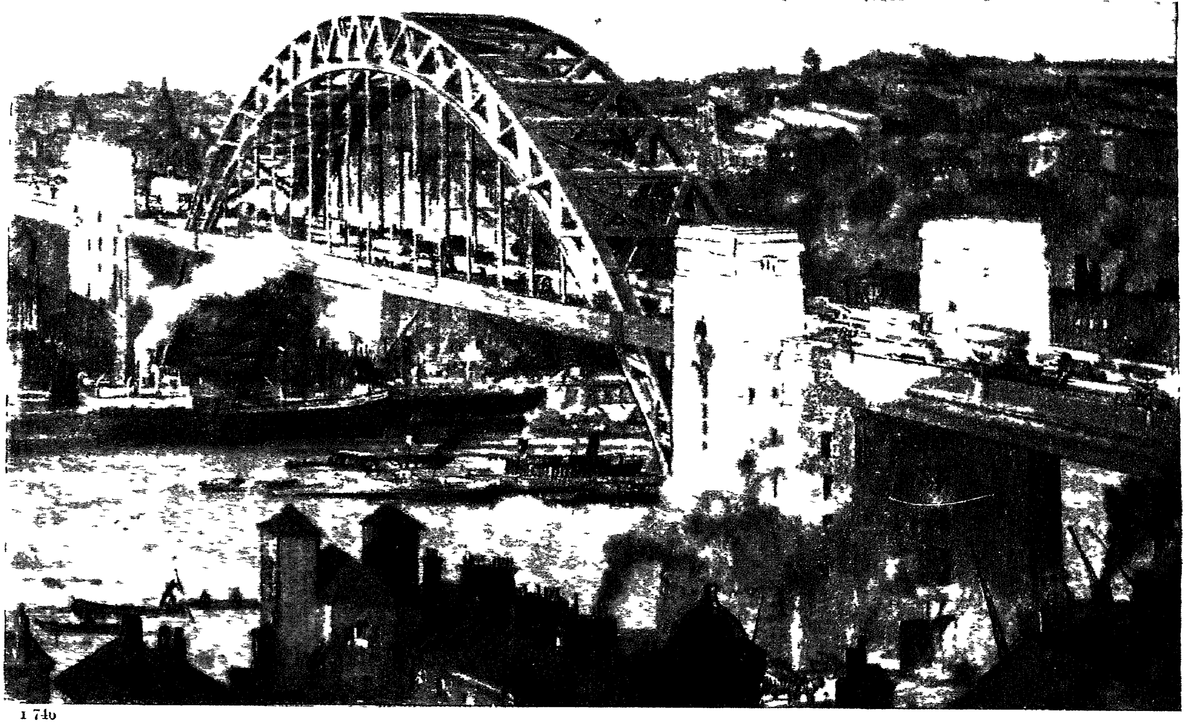
# THE BLAST-FURNACES OF BRITAIN

Come with me to one of the many big iron-works in the Midlands, the district known as the " Black Country ", which lies around Birmingham. We stand in the shadow of a blast-furnace, a round, steel tower, three or four times as high as a house. Into the works' yard comes a long line of trucks, each built to carry ten tons of coal. The trucks are not loaded with coal, however. In fact they seem empty until, on taking a closer look, we find that they are about a third full of brownish-looking lumps — some large, some small.

This is iron-ore, a substance containing iron mixed with impurities, and is so heavy in comparison with coal that the truck is fully loaded by a small amount of the ore. The ore, or " ironstone ", is tipped out to make a great heap, beside which is a heap of coke and, contrasting with this, a heap of greyish-white limestone broken into lumps. These three substances, iron-ore, coke, and limestone, are the materials which the furnace behind us consumes in order to produce iron.



A VIEW OF A LARGE IRON-WORKS THE TWO HIGHEST TOWERS ON THE EXTREME RIGHT AND LEFT ARE THE BLAST-FURNACES



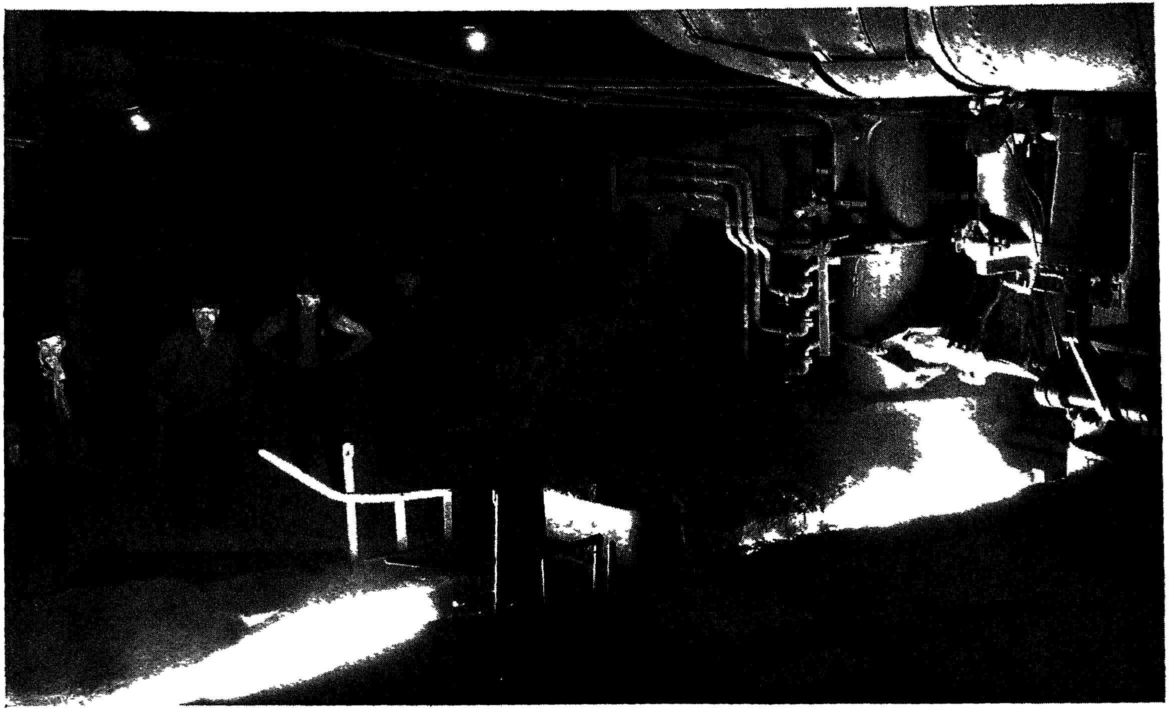
BRIDGE OVER THE TYNE AT NEWCASTLE

We watch with interest to see how the monster is fed. A travelling crane running on a railway of girders picks up two tons of ore in its mighty grab and travels up a sloping track to the top of the furnace-tower. The grab opens, and the load of ore drops into the circular hole, or "hopper", at the top. Down comes the grab, this time to pick up a load of coke which is also taken to the furnace-top and dropped into the hopper.

So the crane continues to feed the furnace with ore, limestone, and coke. When the furnace operators consider the hopper is full enough, a control is moved which opens the furnace to allow the mixture to drop out of the hopper into the flames beneath. Flames and smoke gush out at the top, for the interior of the tower is blazing with the heat of white-hot coke, melting ore, and limestone.

To make the heat more intense, hot air is forced through the furnace from near the bottom. The air is driven through pipes by huge fans, and it is because this strong blast of air is kept moving through the hot mixture that the towers are known as blast-furnaces. The tower itself is lined with special heat-resisting fire-bricks.

The hottest part of the furnace is near the bottom, and it is here that the ore and limestone melt, and molten iron is formed. By looking through a " sight-



“TAPPING” THE BLAST-FURNACE NOTICE THE DITCH ALONG WHICH THE MOLTEN IRON IS FLOWING hole " near the base of the tower, the workers can see the molten iron trickling through the glowing coke. The limestone dissolves the impurities of the ore to form what is called slag, which collects with the iron at the bottom of the tower. The slag, however, is lighter than the iron, and two fairly distinct layers of liquid are formed — the lower one of molten iron, and the upper, of molten slag.

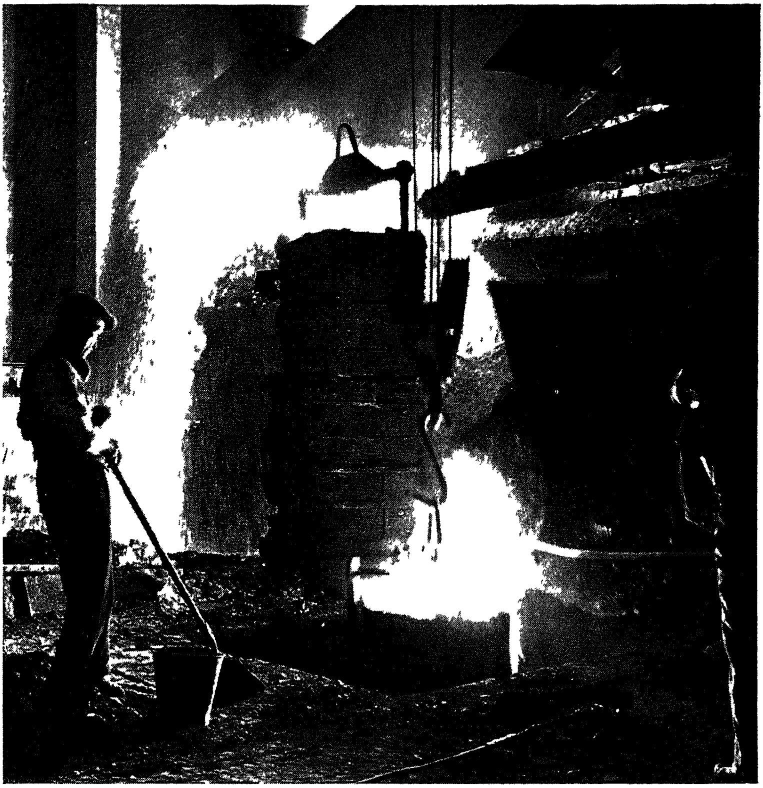
When it is considered that sufficient iron has collected, a bung hole, very near the bottom of the tower, is opened. The bung, a circular plug of fire-clay, is knocked from its place by two workmen, one of whom rests a " four-foot " chisel on the plug, while the other gives the end of the chisel a blow with a hammer. As soon as the plug is removed, the white-hot iron spurts out and flows along a ditch, or trough, which has already been prepared for it. The trough leads to the " beds " of clay-like soil where several smaller channels have been dug, branching from the main channel.

Gradually the molten iron fills all the channels, and the earth is covered with a glowing " tree " of bars of slowly-cooling iron. The plug is replaced in the furnace, and from another outlet the liquid slag is drawn off into a " slag-pit ", where it sets to form a black, solid mass.

Another charge of ore and fuel is admitted at the top of the furnace, and so the work of iron-making goes on. Blast-furnaces continue their work both night and day, but after about a year's running the furnace is allowed to cool so that the inner lining of fire-bricks, which are now badly burned, can be replaced by new.

While the iron in the " beds " is still hot, though solid, the workmen shovel cold sand on to the junctions of the iron branches where they wish to break the metal into bars, or " pigs ". The sand takes the heat quickly from the iron on which it rests, and this has the effect of weakening the metal at those places. Other workmen then deal a sharp blow at the junctions with 28-lb. hammers, and so the branching iron is broken into bars of pig-iron. The slag is also broken up into lumps, and is ultimately sent out of the works to be used in the making of roads.

Although the blast-furnace has achieved a very important task in producing iron from the ore, the metal from the " beds " is still too impure and brittle to be of much use in practice. Some of the pig-iron, or cast-iron, is melted again to make a purer and tougher metal known as wrought iron, but most of the blast-furnace iron is heated in a special furnace which converts it into steel. Although steel is only pure iron mixed with a very small amount of carbon, the difference between the two metals is extremely



AN EVERYDAY SCENE IN A STEEL FOUNDRY

important. Steel is very much stronger than iron, and the furnaces, or "convertors", which turn the iron into steel, are just as important as the blast-furnaces which produce the iron.

Ever since the middle of the eighteenth century, when various inventions improved the methods of smelting iron, Britain has been one of the chief iron and steel producing countries of the world. Bridges, buildings, ships, and engines, built with British steel, are to be seen in every quarter of the globe. The grand Sydney Harbour Bridge, for example, is composed of girders which were made in the steel works of Middlesbrough.

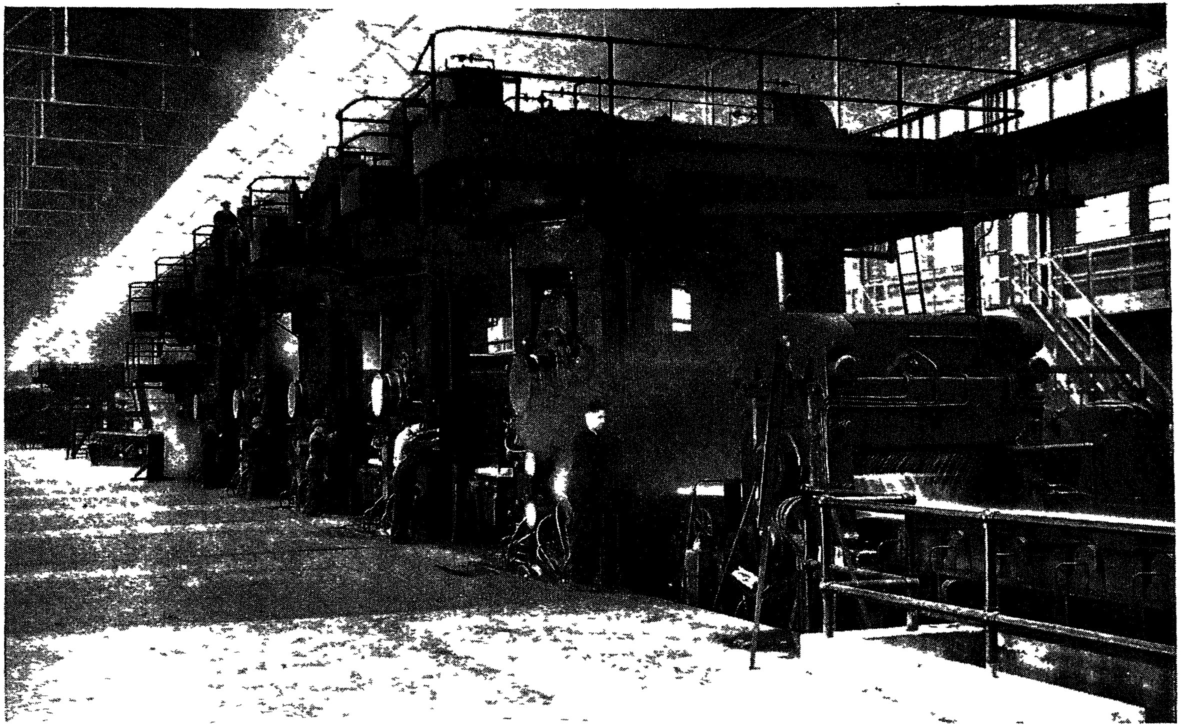
On almost every coalfield in Britain ironworks are to be found. So much steel does Britain make that her own supplies of iron-ore are not nearly sufficient, and ore in great quantities is imported from Sweden, Canada, and Spain. The transport of the heavy ore by land is expensive, and manufacturing areas far inland make small articles, while those near the sea make articles of greater size. The Black Country, for example, is far from the sea, and the towns of this district, such as Birmingham, Wolverhampton, Walsall, and Coventry, manufacture articles like locks, keys, bolts, motor-cars, and bicycle parts, screws, pins, nails, sewing-machines. These goods require much labour considering the amount of iron employed.

In the Clyde Valley, however, the iron-works are within easy reach of Glasgow, the port to which the ore ships come. The men of the Clyde Valley are employed in hammering the steel into huge plates for ship-building, or making tremendous girders for bridges and buildings, or strong rails to bear the weight of heavy trains both at home and in every part of the British Empire. The steel-workers of the Clyde and of Durham and North Yorkshire can also manufacture these bigger goods, because the coalfields of these areas lie near the sea.

On the South Wales coalfield, with its great ports of Cardiff and Swansea, much of the steel is used in the manufacture of “tin-plate”, which is used for making “tins” for condensed milk, corned beef, and canned fruit. Nowadays most tin-plate is made in continuous rolling-mills. The tin-plate actually starts as slabs of steel, each of which is a few feet long, from 3 to 6 inches thick, and about 30 inches wide. The slabs are heated white hot and then fed into a series of heavy rollers, which bring a tremendous pressure to bear upon them. The first set of rollers reduces a slab to a sheet an inch thick and 20 feet long, and each of the following sets makes it still thinner. By the time it leaves the last set the slab has become a strip 300 feet long and $\frac{1}{16}$th of an inch thick. This process is known as “hot-rolling”.

As the strip leaves the last set of rollers, it is wound into a coil and allowed to cool. The coil is then unwound into a “pickling” tank of chemicals to remove scale and reeled up again after passing through it.

The coils are now taken to the “cold-rolling” mills, where the strip is passed through another



TINPLATE MANUFACTURE — A SERIES OF ROLLERS IN A CONTINUOUS ROLLING MILL series of heavy rollers which reduce the thickness, sometimes to as little as $\frac{1}{2000}$th of an inch. The strip is again coiled as it leaves the rollers and, after further treatment, is unwound into a trimming machine, which cuts it into sheets.

The sheets of steel are again "pickled" and are then passed through a bath which covers them with a thin coat of tin — the slab of steel with which we started has become "tin-plate" at last. Welsh tin-plate is exported to all parts of the world, and often, strangely enough, returns to us containing milk, fruit, meat, or fish.

Sheffield, in Yorkshire, is yet another place where steel is used in a particular way. Sheffield is famous the world over for its cutlery — knives, scissors, razors, and chisels.

Many people consider that the making of steel and steel goods has been more important than anything else in building Britain's greatness. It is quite certain, at least, that we all owe a great debt to the blast-furnaces and the men who work them.

## QUESTIONS

1. What do you know about cast-iron, wrought-iron, and steel?
2. Name four parts of Britain where you would see many blast-furnaces. What do the people make from the steel in each case?

## EXERCISE

In a recent year Great Britain exported: Iron and steel goods (girders, railway lines, etc.), 36 million pounds' worth; machinery, 30 million pounds' worth; vehicles (locomotives, ships, cars, etc ), 24 million pounds' worth

Draw and label rectangles to show the comparative values of our iron and steel exports.

## TEMPERATURES NORTH AND SOUTH OF THE EQUATOR

As a rule the nearer a place is to the equator the warmer it is.

*Exercises.*

1 The temperatures in Aberdeen, Hull, and London, in a certain month, are 60° F., 58° F , and 64° F , but not in that order Find the places on a map and write the name of each town with its correct temperature.

2. Do the same with these towns:

   Sydney, Rio de Janeiro, Christchurch (New Zealand) The temperatures are 40° F , 68° F., and 50° F. (in the wrong order)

3. Britain (north of the Equator) has summer while New Zealand (south of the Equator) is having winter. The summer and winter temperatures of London are 64° F. and 40° F. respectively Which of the following is the July temperature of New Zealand 40° F., 64° F.?

## CHAPTER 6

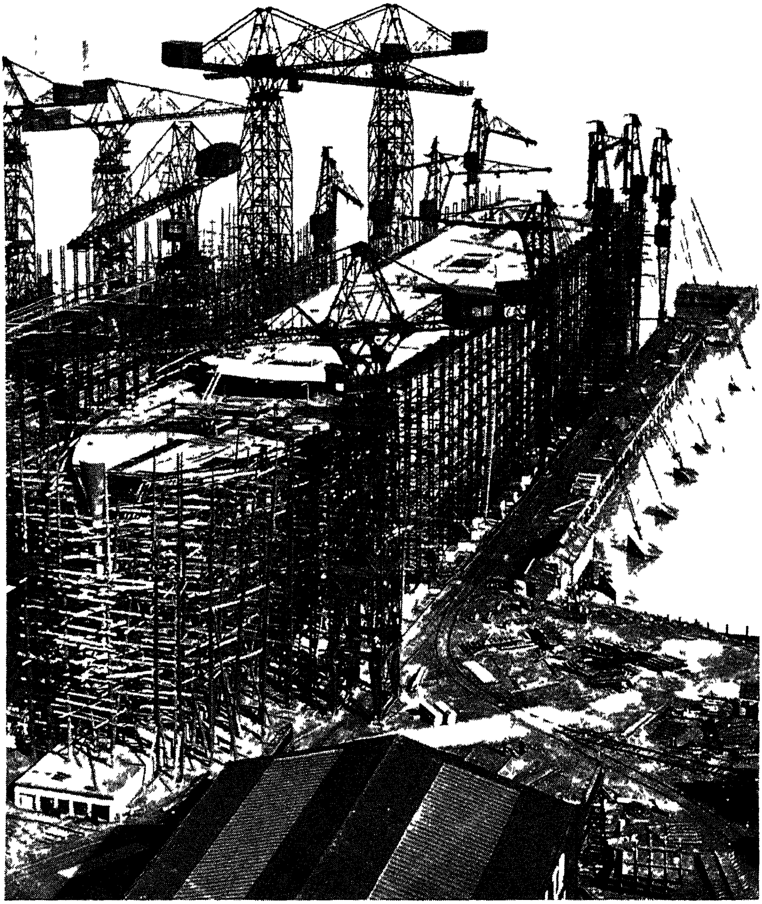
# IN BRITAIN'S SHIPYARDS

There are many boys and girls who live so far from any great port that they have never seen a really large ship.

Let us imagine what a ship of average size would look like if it were high and dry. The space covered by the vessel would be roughly equal to two football pitches placed end to end. The main deck would be about 50 feet above the ground. Your house is probably about 30 feet high, and this is the depth to which the ship sinks into the water when she is loaded.

Before such a ship is built much work has gone on " behind the scenes ". Our merchant fleet is controlled by business companies who borrow large sums of money from people who are willing to lend their savings. Each shipping company builds or buys a fleet of ships which fly the company's flag, and the hulls and funnels of which are painted in a certain way. A shipping company usually serves certain countries, and its ships keep to the same sea-routes.

It is quite clear, then, that each company is con-



A LARGE LINER ON THE STOCKS

cerned with certain kinds of cargo, and has its ships built to suit the carrying of such cargoes. A grain steamer will need big holds, while an ordinary cargo boat will need a large number of smaller holds for storing its " mixed " cargo. The small holds, furthermore, will be arranged in decks, or layers, so that cargoes intended for the most distant ports can be stored low in the ship, partly because it will be the last to be unloaded, and partly to act as ballast after the upper cargoes have been discharged. Ships intended for oil carrying will need an equipment of tanks and pumps. Meat-carrying vessels will require cold storage chambers.

When, therefore, a shipping company decides to build a new ship, the directors discuss the work it is to do, and the size they wish it to be. Having decided the main details, they ask either a firm of naval architects or a shipbuilding company to prepare general plans of the ship. When the plans are drawn up, they are submitted to a shipping insurance corporation, either Lloyd's or the British Corporation, to make quite certain that, when the ship is completed, the corporation will allow the shipping company to insure the vessel. A ship costs such an enormous sum of money, and has to face so many risks, that no company would sail the ship unless it was insured.

When the general plans have been passed by

Lloyd's or the British Corporation, the shipbuilders make an exact model of the ship in paraffin wax. The model, which is about ten feet long, is very thoroughly tested in a huge tank, rather like a swimming-bath. Every kind of storm is imitated in the tank to see how the model behaves under every condition. As the roughness of the water is altered, the pitch and roll of the model are carefully observed, and, if necessary, the shape of the model is altered again and again, until its behaviour is quite satisfactory.

From the model, an army of draughtsmen prepare the plans which are to be used by the builders. Three sets of plans are usually prepared; one set for the hull, one for the machinery, and one for the cabins and equipment. As these plans become available, they are taken to a huge building called the "moulding loft", which has a floor painted black, and is as large as the ship itself. On the large floor of the "loft", full-size plans are prepared from the smaller plans drawn by the draughtsmen. The full-scale plans are necessary to ensure that every single section of the ship will fit exactly into position.

While this work is proceeding, busy preparations are being made on the slipway, where the ship will actually be built. "A ship is going on the stocks!" The news travels fast, for it will mean months of work for thousands of people.

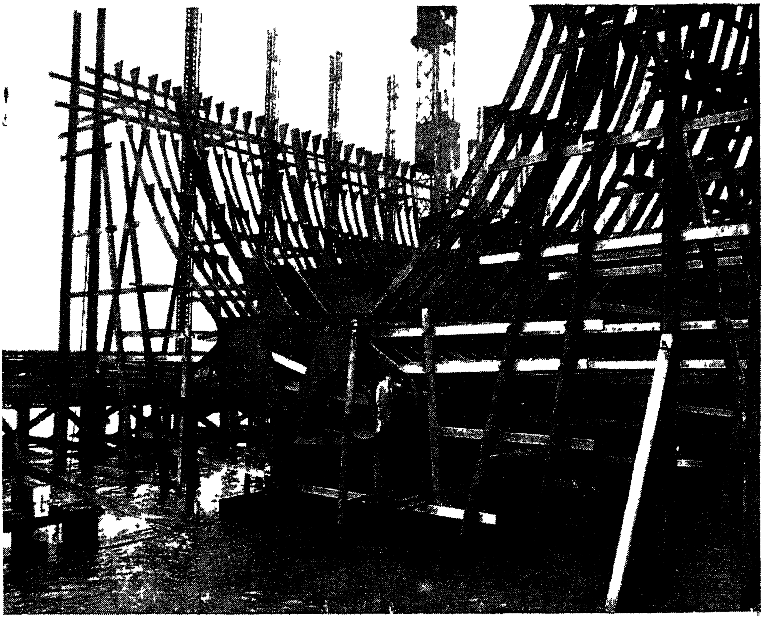
The slipway is built on a piece of ground usually on the very low banks of a deep river. Two rows of timber or concrete piles, about six feet in length, have been driven right into the ground a few feet apart to make perfectly certain that the huge weight of metal will not sink into the earth and so prevent the launching. On to these rows of piles are laid the two wooden slipways which are perfectly parallel and slope down gradually towards the river, with a gradient of half an inch in every foot. Between the slipways are built up the " keel blocks " which take the whole weight of the vessel while she is building.

At the forward end of the keel blocks the " stem " of the ship, a huge casting of steel, is built in, while at the after end is built the sternpost to carry the rudder. The sternpost is another forging or casting of such immense size that special arrangements have to be made by the railways for its conveyance to the shipyard. Between the stem and the sternpost, and running the whole length of the keel blocks, the keel is built up of steel girders and plates riveted together.

During these operations, scaffolding has made its appearance to facilitate the building in of the skeleton of the ship, a framework of steel girders. The flooring plates are riveted into position, and later the great watertight partitions, or bulkheads, several of which are built into a ship so that if one part of the ship is damaged, the rest of the vessel can be "cut off" by the bulkheads and so prevent the ship sinking. The "plating", or outer shell, is next riveted into position. The plates employed are from half an inch to an inch thick, and they are made as long as possible to save joints.

In most shipyards we still see riveters at work in the old-fashioned way. A boy with tongs places the red-hot rivet in its hole. While a workman, on one side of the plating, holds a hammer to the head of the rivet, two riveters, on the other side, swing rhythmically with their long-handled hammers, until the rivet flattens and binds the plates powerfully together. Riveting-machines are frequently used, and in some cases the edges of the plates are welded, or melted together. The advantage of welding is that the ship is lighter because rivets are not used, but it is not yet certain whether welding is as satisfactory as riveting.

After the huge steel shell of the ship has been constructed, and the propellors or screws have been fitted, she is ready for launching. The workmen build up the slipways and grease them with soft soap and tallow. They then drive in great wedges which raise the slipway, until the vessel is just lifted off the keel blocks. The ship is now poised on the slipways ready for its downward slide into the river.



A STERN VIEW OF A LINER ON THE STOCKS

Huge chains, called drag-chains, are attached to the vessel, and the great moment of launching is at hand.

The launching is an event of great ceremony. At the appointed time, the heads of the shipping company and of the shipbuilding company, together with the men who have been engaged in the building of the craft, assemble near the slipways. A lady who has been invited to launch the ship first breaks a bottle of wine upon the bows, gives the vessel its name, and then presses a switch. The "triggers" devices which have kept the vessel in position, are released. The new ship feels her freedom for the first time. Very slowly, on the greasy slipways, she begins to move towards her natural domain. Gathering speed, amid waving flags and cheering people, she slides towards the river, where tugs are ready to control her. The drag-chains come into action one by one to slow down her mad career, and — the ship is afloat!

The waiting tugs jockey her into the fitting-out berth, where she will lie afloat for many months while engineers put in her engines and boilers. Carpenters, plumbers, electricians, fitters, put the finishing touches to the ship. The huge forty-ton rudder is in position, and then — smoke from her funnels!

For a period of from 24 to 48 hours the mighty heart of the ship beats. The engines are being "run in", tested, and adjusted. If all is well she is towed into dry dock for cleaning and painting below the water-line, and the first of her crew appear. The ship then proceeds for tests over the "measured mile" to ascertain her speed and sea-going qualities. Thus another great vessel is now ready to bring food to Britain's teeming millions, and to carry her goods to other countries.

Just as British steel is used the world over, so many of the finest ships owned by other countries are built in the shipyards of our land. Not only can our people

A NEW LINER LEAVES ON HER MAIDEN VOYAGE

make the fine steel, necessary for the work of shipbuilding, but they also have a good choice of suitable places for building and launching. The estuaries of rivers like the Clyde, Tyne, Tees, and Mersey are calm, deep-water channels bordered by low-lying banks, and are, furthermore, situated near coal and ironfields. All these estuaries, therefore, engage successfully in the building of ships.

The mighty *Queen Mary* and her bigger sister the *Queen Elizabeth* are both "Clyde-built", an expression which is accepted in shipping circles as the hall-mark of a fine ship. Down the slipways of Glasgow, Clydebank, Port Glasgow, Greenock, and Dumbarton have gone innumerable ships that have made sea history in every ocean under the sun.

Each shipbuilding area claims for itself the pride of place as Britain's finest shipbuilders. The Tyneside towns of Newcastle and Gateshead vie with Liverpool and Birkenhead on the Mersey, or, with the Clyde, with Barrow, or with Belfast.

There are, too, many towns where ships smaller in size, but not less important, are built for special trades. Hull, Grimbsy, Yarmouth, Lowestoft, and Dundee compete with one another in the building of trawlers and drifters for the fishing fleets. Chatham, Sheerness, Portsmouth, and Devonport are engaged in producing the warships which guard our sea routes.

Nor must we forget that scores of inland towns have a hand in the great work of making ships. At Norwich, vast quantities of electrical gear, motors, winches, cargo-hoists are made. The "screws" of many vessels are constructed at Deptford in London. Birmingham and Coventry are busy, manufacturing motors and machinery. The towns of Lancashire and Yorkshire provide carpets, table linen, and furnishing materials. From the Potteries come huge quantities of china.

When, therefore, a large vessel is on the stocks in a British yard, workers in all parts of Britain are given employment, and when the ship is launched they are all proud to have helped in her creation.

## QUESTIONS

1. What steps are taken before the building of a large ship begins?
2. What part do the following play in shipbuilding: a slipway, a moulding loft, drag-chains, a fitting-out berth?

## EXERCISES

1. Here are the names of some of the chief shipping companies Find out where the vessels belonging to the companies go, and what are the outward and inward cargoes they carry. Copy the table into your note-

book and complete it. Find out, too, what the various abbreviations stand for.

| Company | Route | Outward Cargo | Inward Cargo |
|---|---|---|---|
| C P R | | | |
| Cunard-White Star S S Co | | | |
| R M S P Co | | | |
| Blue Star Line . | | | |
| Houlden Bros . | | | |
| N Z S Co . . . | | | |
| Shaw Saville S Co | | | |
| P &O S N Co | | | |
| Blue Funnel Line | | | |
| British India S N Co | | | |
| Anchor Line | | | |
| Donaldson-Atlantic Line | | | |

2. On a rough map of the British Isles mark the chief shipbuilding ports. Under each name print the type of craft built.

3. Collect coloured pictures of steamships belonging to the companies named in Exercise 1. You may also be able to collect pictures of their funnels and flags.

## TEMPERATURE GRAPHS

Here are temperatures taken in Calcutta and Archangel. (Calcutta is much nearer the Equator than Archangel.):

| | Mar | June | Sept | Dec |
|---|---|---|---|---|
| Calcutta. | 79° F. | 84° F. | 82° F. | 65° F. |
| Archangel· | 17° F. | 54° F. | 46° F. | 9° F. |

Draw two graphs, using the same set of vertical and horizontal lines for both, to show the rise and fall of temperature in the two places during the year.

From a map of the world find how far Britain is from the Equator compared with Archangel and Calcutta, and, on the same paper on which your two previous graphs are drawn, show where you judge the graph of British temperatures should be drawn.

A DOCK SCENE IN LONDON CAN YOU TELL BY THE CARGO FROM WHICH COUNTRY THE SHIP MIGHT HAVE COME?

## CHAPTER 7

# OUR DOCKS

If you look at a photograph of the Royal Docks, Port of London, you will see the River Thames meandering across the picture, while large areas of water, looking like oblong lakes, lie near the river banks. The lakes are the docks. They are artificial, and each is connected with the river by a deep, narrow channel fitted with strong gates to shut off the docks from the river. In most large seaports, docks are made on a similar plan, though in some ports, Glasgow, for example, there are no gates, and the docks are open to the river.

Within a short distance of a large town, and within the tidal waters of the river, these water-sidings are provided to enable ships to discharge or take on cargoes without causing congestion in the river. Docks are also necessary because the depth of the river itself varies with the tides, and liners require constant deep water to keep them afloat all the time they are being unloaded. Many modern liners weigh between 50,000 and 80,000 tons, and a depth of from 40 to 50 feet of water is often necessary.

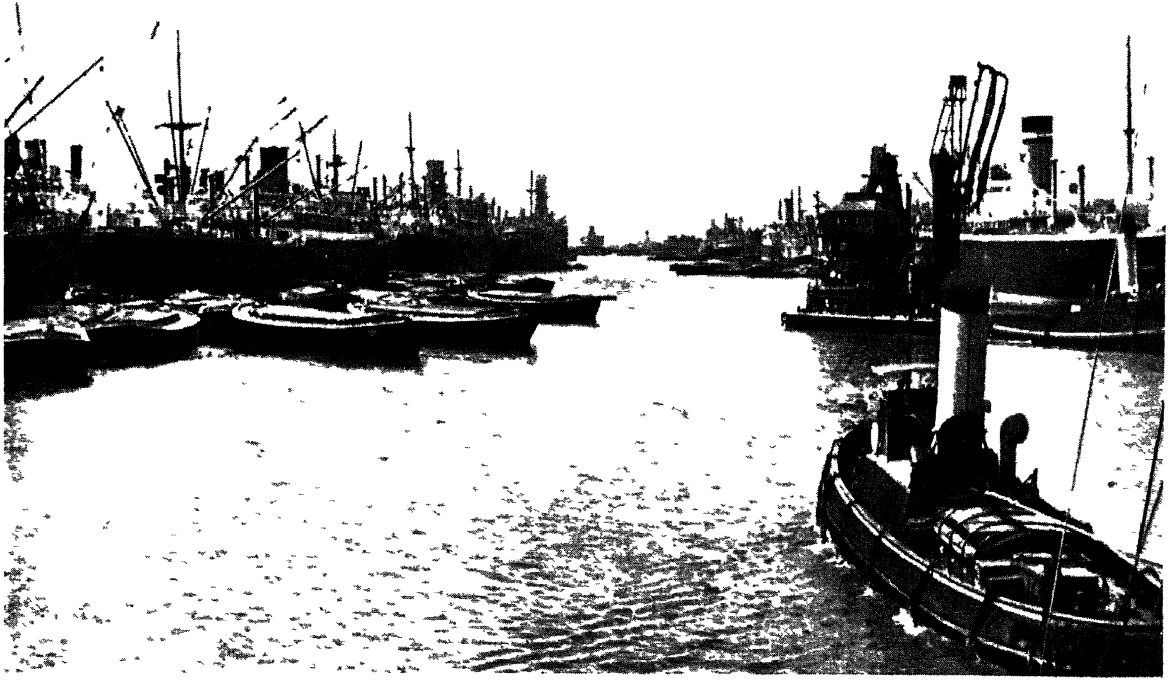
You can see that it is much easier to work a ship from the straight, firm quays on a dock side than it would be from the muddy, curving banks of the river. There is greater length of shore, railways can be constructed along the quays to carry enormously strong cranes, and better foundations can be laid for the huge sheds and warehouses in which cargoes are to be stored. Docks, too, can be enclosed by high fences, and closely guarded by police to prevent clever river thieves from stealing the valuable cargoes.

But how is the water to be kept in the dock when the tide in the river goes down, and how can ships sail in and out of docks on to different levels of water? There you will see the value of the narrow channels leading from the river into the dock. The channels, or locks, as they are called, have strong, electrically-controlled gates at each end, so that men may allow water to enter the lock from one end at a time. Even then the whole of the gate is not opened at first, but only small parts of the gate, called sluices, so that water is admitted slowly.

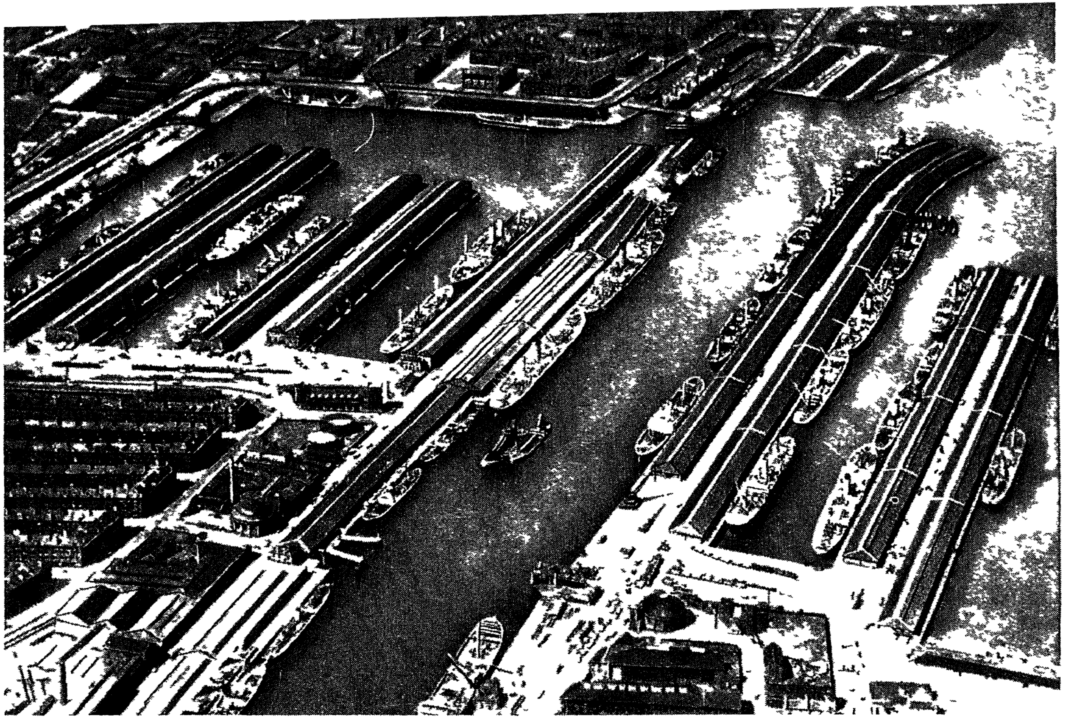
If a ship wishes to enter the dock when the river is low, the sluices in the gate leading from the river are opened until the water in the river and the lock reach the same level. Then the heavy gate is opened and the ship sails into the lock. The gate behind the ship is then closed, and the sluices in the dock gate in front of her are opened. By this means, the level of the water in the lock is slowly raised, lifting the ship with it, to the dock level. The second heavy lock gate is then opened and the ship passes into the dock itself. We say that the ship passes into the dock. Really she has to be skilfully kept straight and coaxed through the locks by thick, steel hawsers attached to small, but very powerful vessels, called tugs.

In a port like Glasgow, where the water in the docks is tidal and there are no locks, large ships rest on the soft mud bottom at low tide.

Before the ship makes her journey through the



SHIPPING IN THE ROYAL ALBERT DOCK, LONDON THE SMALLER TUG ON THE RIGHT IS TOWING A PNEUMATIC GRAIN ELEVATOR



AN AERIAL VIEW OF SOME OF THE DOCKS AT GLASGOW  THESE DOCKS ARE TIDAL
THE RIVER CLYDE IS IN THE CENTRE  NOTICE THE DRY-DOCKS IN THE BACKGROUND

locks, however, much preparation has been made for her reception in the dock. The Captain has wirelessed the owners to say when he will arrive. The owners, in their turn, have arranged with the Manager's Office at which quay the ship shall be berthed, and in which warehouse her cargo shall be stored. Her export cargo is then taken to the same quay, ready for loading. Cranes are brought into position and gangs of men, known as stevedores, are ordered to be ready at a stated time to unload and reload the ship.

While these preparations are being made, the ship, under the control of the Captain, assisted by the River Pilot, is coming up the river. She stops. The River Pilot is dropped and the Port Doctor comes aboard. He is satisfied that there is no infectious disease on board, and the ship is " cleared ". The ship's officers, assisted by the crew, have unbattened the hatches and rigged the derricks, or cargo cranes. The tugs come alongside. The First Officer with the fo'castle crew is at the bows, the Second Officer with the after crew is at the stern. On the bridge are the Captain, the Third Officer, and the Dock Pilot, who has just come aboard. At the wheel stands a Quartermaster. The lock gates are opened, and the vessel is worked into the lock in response to shrill whistle commands.

Slowly she slides into the narrow channel, and the first gate is shut. A wait for a quarter of an hour while the water is levelled, and the second gate is opened. Very slowly the ship glides forward into the dock and approaches her berth. Lines are thrown ashore to the shore gang, winches clank and grind as the monster is drawn in to the quay-side. Gangways are lowered, passengers disembark and proceed to the Customs shed, while the gangs of stevedores go aboard the ship. A white pennant bearing a scarlet bugle and crown, fluttering from the foremast, shows that the ship has His Majesty's mails on board. Cranes whirr, derricks creak and groan, clanking engines chug, and up come the mail bags, passengers' luggage, and even cargo, for time is money, and the vessel must be unloaded with all safe haste.

Gangs, each of thirteen dock-workers, are in the holds, sorting the cargo by means of the strange marks on the packages. Other gangs are on the quayside receiving the discharged cargo. Swinging over the sides come wooden cases of apples, of tinned fruits, or of oranges from Australia and South Africa; or bales of wool, or carcasses of frozen mutton from far Australia and New Zealand; or quarters of beef from the Argentine; or huge round drums of tobacco from America.

INSPECTING WOOL AT A LONDON DOCK

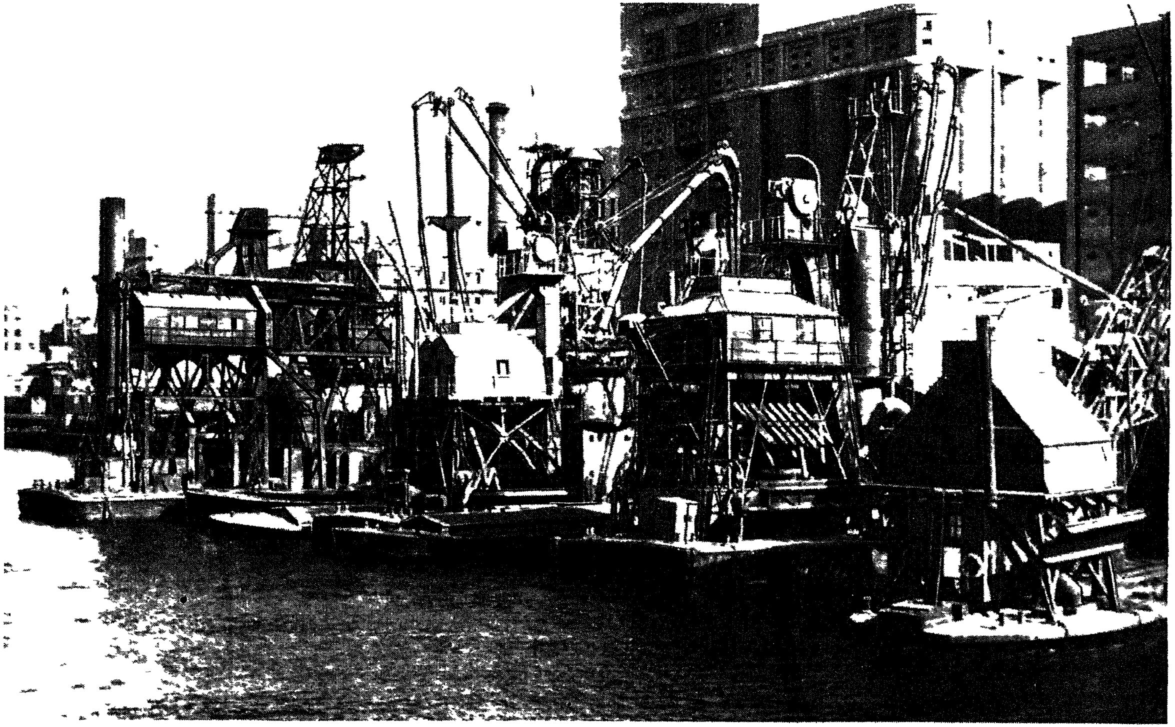
Small electric trolleys hurry some of the cargo into the dock sheds. The frozen carcasses are swung aloft, forty or fifty at a time, in nets, or hooked on to an endless conveyor belt. Refrigerator vans are soon speeding with them towards the Cold Store. As we pass on our way we see sacks of coffee beans, hundredweight chests of tea, and bales of raw rubber being unloaded from other ships.

If we were to visit a timber dock, we should see the " ponds " in which great baulks of timber are allowed to soak for many years. Some timber is stored to dry in great stacks, in sheds having good roofs but no sides.

A clanking, whirring, grinding, and hissing rises to a deafening roar as we approach one huge building — a grain elevator — which towers 200 feet above the dock side. A cloud of dust envelops the vessel, from which grain is being sucked out at a terrific speed through great pipes. A 10,000-ton cargo is often cleared in two days without being touched by human hands.

This reminds us of another cargo which is unloaded by suction from importing ships. Oil, both crude, and refined as petrol, is becoming more and more necessary every year. Petrol is dangerous to convey and to store, and is dealt with in docks which are built on marshes or open spaces on the outskirts of general seaports. At Purfleet, in the Thames estuary, for example, 20 miles from the Port of London, we should see oil being drawn out of tankers into great circular tanks made of steel or concrete. Railway tank waggons, road tankers, and barges are then busy distributing the different grades of oil to factories or petrol stations.

There are dock workers engaged in many other tasks besides loading and unloading ships. In nearly every dock may be seen a large ship standing upright in what looks like an empty lock. The ship is in " dry



PNEUMATIC ELEVATORS UNLOADING GRAIN FROM SHIPS AT THE QUAYSIDE dock ". When she steamed into the dry dock, it was full of water, but after the entrance gates were shut, powerful pumps emptied it, while dock workers shored the ship in an upright position with huge timbers. Men are busy hammering or chipping off the old paint from the sides of the ship, or repainting the hull with very large brushes, like tar-brushes. If the ship has been damaged, old plates will be cut out and new ones riveted on before the painting is done. We are reminded of the seen and unseen perils of the sea, which necessitate a periodical overhaul of Britain's merchant fleet, to make each ship fit to be registered "A1 at Lloyds ".

Now that we have gained some idea of a port and its working, let us see how our chief ports have been helped by nature to carry on their work.

London, the largest port in the world, has grown at the nearest point to the sea where bridges can be constructed. It is situated at the highest point on the Thames which can be reached by sea-going ships. The Thames estuary opens out towards the Great Plain of Europe, across which many rivers flow, and bring a very busy trade in the direction of Britain. Before America was discovered, commerce was carried on between the merchants living around the Baltic Sea and those living on the shores of the Mediterranean. London was on the main route of this trade, and soon became an important exchange port. With the growth of American trade and the opening of the Suez and the Panama Canals, the routes of the whole world focused on London.

Merchants met there to conduct their business, and much borrowing and lending of money took place. Ships from every country in the world sailed in and out of the Thames, docks were built for loading, unloading, and storing the costly cargoes, and London became a busy centre for British shipbuilding and repairing. To-day, the Surrey Commercial Docks deal chiefly with timber and dairy produce; the West India Docks receive wool, tobacco, fruit, and sugar, the " Royal " Docks can accommodate the larger ships and deal with all classes of imports. Tilbury may also be looked upon as part of the port of London, for, being nearer the sea, it has deep water at any state of the tide, and is used as the chief passenger depot.

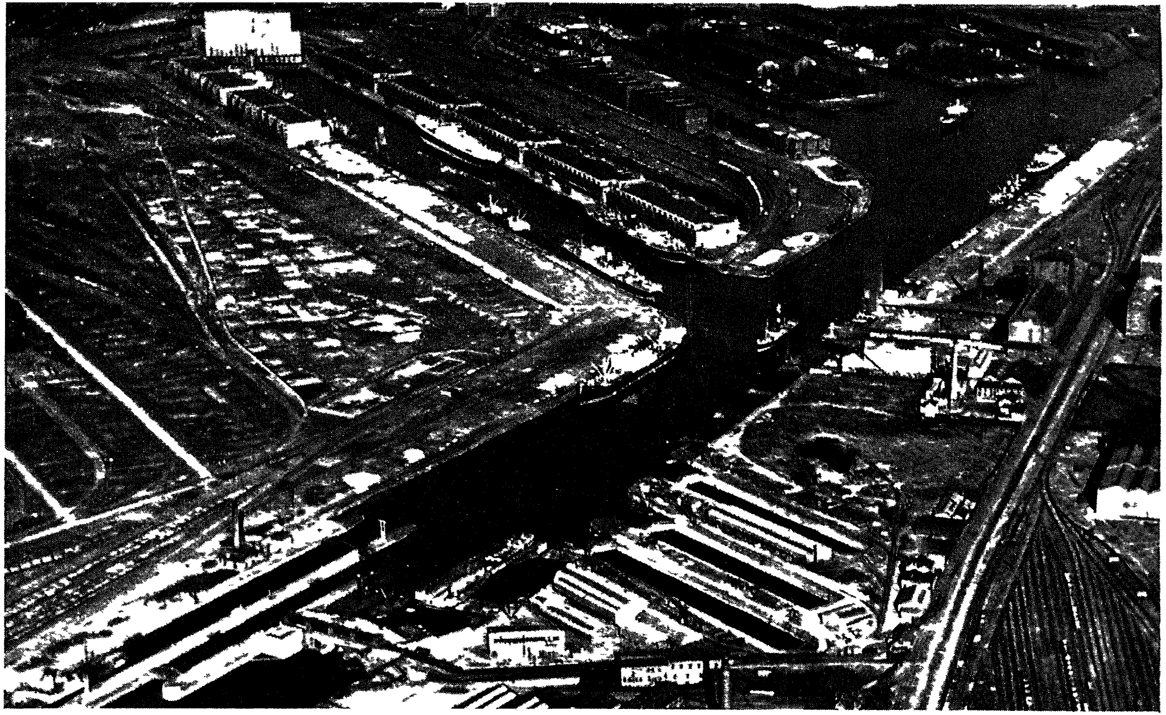
Many of the imports into London are re-exported to other countries. This re-export trade is a source of great wealth to Britain, for British ships are often employed to carry both the imports and the exports.

Liverpool, with Birkenhead on the opposite bank of the Mersey, is the second largest port in the British Isles. It faces west and receives many ships from Canada, the United States, and South America.

Cotton goods and chemicals from Lancashire, woollens from Yorkshire, pottery from Staffordshire, and iron and steel goods from Birmingham, all find a natural outlet through this great western port, so that Liverpool actually exports more goods than London. Passenger traffic with Canada, West Africa, and the Far East has been provided for by the construction of a great floating landing-stage.

One of the strangest ports in the world is that of Manchester. Forty miles inland from Liverpool, it is reached by ocean-going ships through the Manchester Ship Canal. It is a strange sight to see a great ship leaving her top-masts and part of her funnel at the entrance to the Canal. Cargoes of cotton and other goods are conveyed to the quays in the heart of Lancashire, thus saving the expense of " breaking the bulk ", and reloading cargoes on to railway wagons.

Glasgow is Scotland's largest port. It stands at the seaward end of the Clyde, which flows into the western seas. At a time when America was growing from a number of small colonies into the great nations of Canada and the United States, Glasgow provided accommodation for vessels from these far western countries. Hardy and energetic workers found the means at hand for building fine ships at a time when ships were in great demand. As larger ships were needed, the waters of the Clyde were deepened by



AN AERIAL VIEW OF THE HUGE DOCKS AT MANCHESTER. A GRAIN ELEVATOR CAN BE SEEN AT THE HEAD OF THE LARGEST DOCK IN THE TOP LEFT-HAND CORNER OF THE PICTURE dredging up the mud and blasting away a huge quantity of rock which blocked the channel. Coal and iron were discovered near at hand in the Lowland Plain, and the Clydeside towns — Glasgow, Clydebank, Port Glasgow, and Greenock — have held their own as the finest shipbuilding centres in the world. In the deep water the very largest ships can be launched.

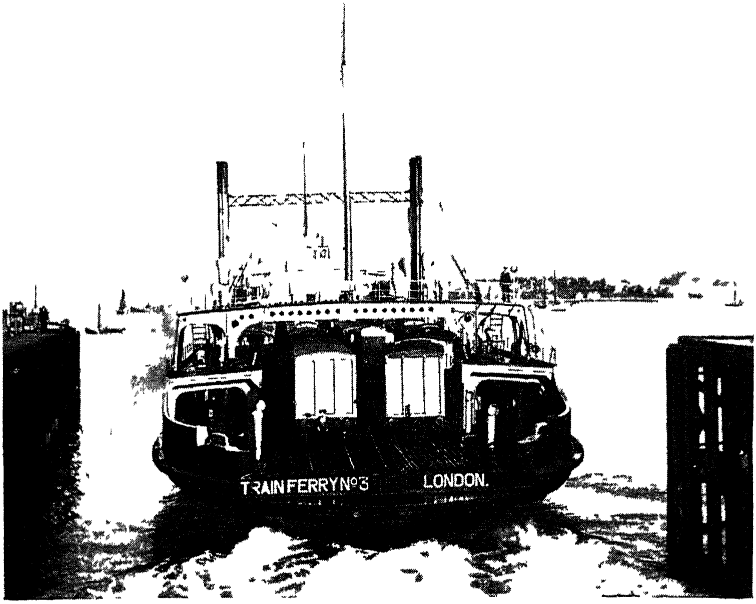
Southampton and Hull are examples of ports which have received unusual benefits from nature. Southampton is "blessed with four tides a day". The Isle of Wight divides each tidal wave into two. Part of the wave flows round the island to bring high water through Spithead several hours after the first wave has advanced and receded through the Solent. Thus the largest ocean-liners can berth at almost any hour of day or night, and passengers bound for London save many hours by landing at Southampton and finishing their journey by train.

Hull can offer cheap facilities for shipping. Not only do the low banks of the Humber provide almost ready-made deep-water quays, but bunker-coal for the ships' furnaces is obtained very cheaply from nearby coalfields. There are many good canals, roads, and railways to convey the imports of raw wool, food, timber, and oil to the woollen manufacturing towns of Yorkshire. Hull itself has a great fishing industry which provides a cheap food for many of the workers.

Bristol on the Avon is a very old port. In Tudor times it carried on most of our trade with the West Indies and the Mediterranean, and its present-day manufactures of tobacco and chocolate remind us that it still deals with imports from warmer lands. With its daughter seaport, Avonmouth, it is still the centre of an important West Indian trade, although much of its trade has now been taken by Liverpool, Southampton, and London.

Plymouth, Belfast, and Cork are mainly ports of call, where ships stop for mails or passengers. Belfast has some of the finest shipbuilding yards in the world, and carries on much of the trade between Ireland and the United Kingdom, through Stranraer, Ayr, Ardrossan, and Liverpool. Belfast and Cork have become the last ocean ports of call for vessels bound for America.

Before we conclude this chapter on the docks and ports of Britain, we must mention the smaller but important "ferry" ports which communicate with Europe by means of fast "packet" steamers. Dover, Folkestone, and Newhaven are in direct communication with corresponding ports in France, and thence to the main Continental cities. From Harwich sails a train ferry which carries loaded railway trucks across the North Sea to Zeebrugge in Belgium, and from



THE HARWICH-ZEEBRUGGE TRAIN FERRY

that country the trucks, still loaded, travel to Germany, France, and Italy.

You will see from the number of ports mentioned in this chapter, that Britain is blessed with good harbours on every coast. The fact that we live on an island with an indented coast has made our country a home for ships from the earliest times, and as the trade of the world has increased and ships have become ever larger and larger, the sheltered bays and estuaries have proved wide enough to accommodate the biggest liners. Britain is still the chief trading country of the world.

## QUESTIONS

1. Why is it better to unload ships in a dock than on the open banks of a river?
2. How are meat, corn, and timber stored in a dock?
3. Give reasons for the development of three of the following ports: London, Glasgow, Liverpool, Belfast, Hull, Bristol, Southampton.

## EXERCISES

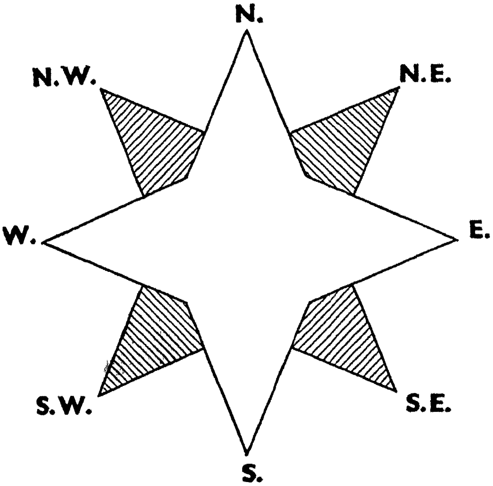
1. Complete this table. (Use a map of the British Isles.)

| Port | Chief Towns within 100 miles | Chief Industries of these towns |
|---|---|---|
| London | | |
| Glasgow | | |
| Liverpool | | |
| Hull | | |
| Southampton | | |
| Bristol | | |

2 Use your atlas to build a table of "ferry" ports, as in this example:

| *From* | *To* | *Connecting with* |
|---|---|---|
| Harwich | Zeebrugge | Belgium, Germany, Russia |

Make your table by beginning with the following: Dover, Folkestone, Newhaven, Southampton, Weymouth, Fishguard, Liverpool, Heysham, Aberdeen, Dundee, Leith, Newcastle, Hull.



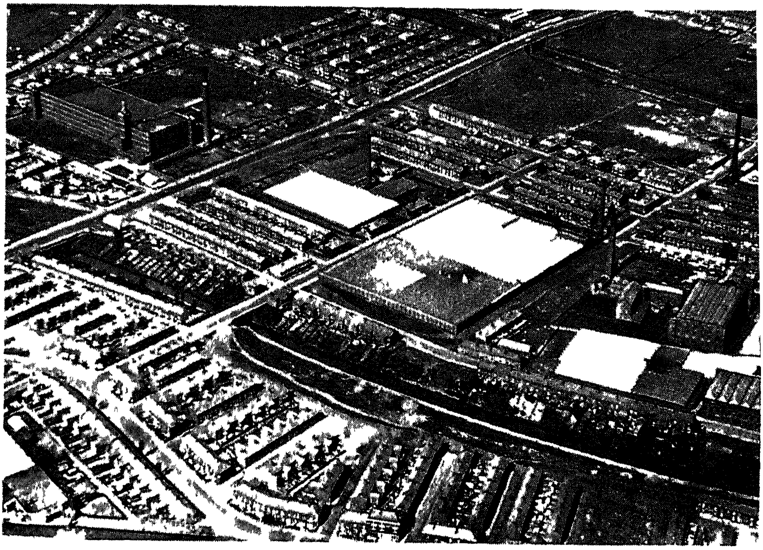
## THE COMPASS

Cut out and colour a compass card. Mark the compass points and paste the card on the underside of the lid of your desk so that the letter N points to the north of your classroom.

Two or three boys working together can make a large card which can be fastened to the ceiling of your room.

On which sides of your room lie London, Edinburgh, Dublin, Canada, India, South Africa?

Draw a simple map showing the main street of your town, and place it in your room with the streets running in the right compass directions.



COTTON MILLS AT PRESTON, LANCASHIRE

## CHAPTER 8

# COTTON-SPINNING AND WEAVING

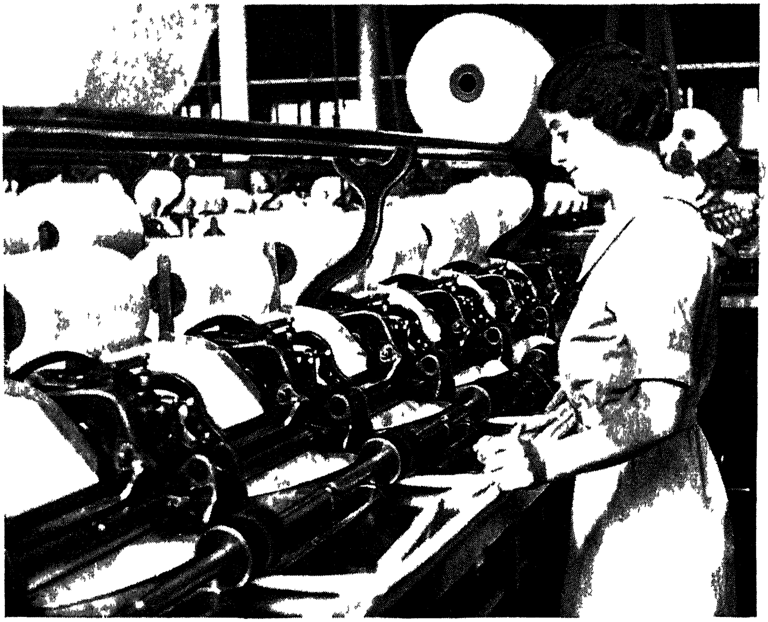
Let us imagine that we are flying in an aeroplane above Preston, one of the great Lancashire cotton towns. We soon pick out the weaving "sheds"—stone built, with no windows at the sides, but with "skylights" in the roof. It is not the factories, however, or the tall chimney-stalks at which we marvel, but the arrangement of the houses.

The factory-workers' dwellings start, it seems to us, from the very walls of the factories themselves, and are packed around the works in countless rows laid out in a regular, monotonous pattern of parallel streets. It is quite plain that these houses were built around the factories specially for the cotton workers, and we notice that no open spaces were left for recreation. This place is obviously ruled by King Cotton.

Preston is only one of the many large towns in this county which have grown up around cotton mills. We are glad that the people living in these dreary towns can enjoy, in their spare time, the lovely scenery of the heather-clad hills, outliers of the Pennine Chain.

As we journey about in Lancashire we discover that the cotton towns are really in two groups. The towns in the south of the county, such as Bolton, Bury, and Oldham, are engaged mainly in spinning. In the north of Lancashire, however, is a group of " weaving towns ", among which are Preston, Blackburn, and Burnley. We then realize that most of the raw cotton makes an interesting journey, first to Manchester from the land where it was grown, then to a town in south Lancashire to be spun, and, finally, to one of the northern towns to be woven.

Manchester is the great " cotton city " of Britain. Although many of the Lancashire towns spin or



IN A LANCASHIRE MILL  THE COMBING MACHINE AT WORK

weave more cotton than this great city does, Manchester is the most important of all. It is here that we find the huge warehouses, the merchants' offices, the cotton markets, and, last but not least, fine docks — forty miles inland from the sea-coast!

For the Manchester Ship Canal, built towards the end of the last century, enables ocean-going ships to sail direct from the Atlantic to Manchester. Although more raw cotton is still discharged at Liverpool than at Manchester, the Ship Canal is very busy. It is well equipped with dry docks and locks, while its

THE RIBBON LAP MACHINE IN A COTTON MILL

banks are lined with factories, warehouses, and railway sidings, which are connected with the maze of rail-tracks covering the great county.

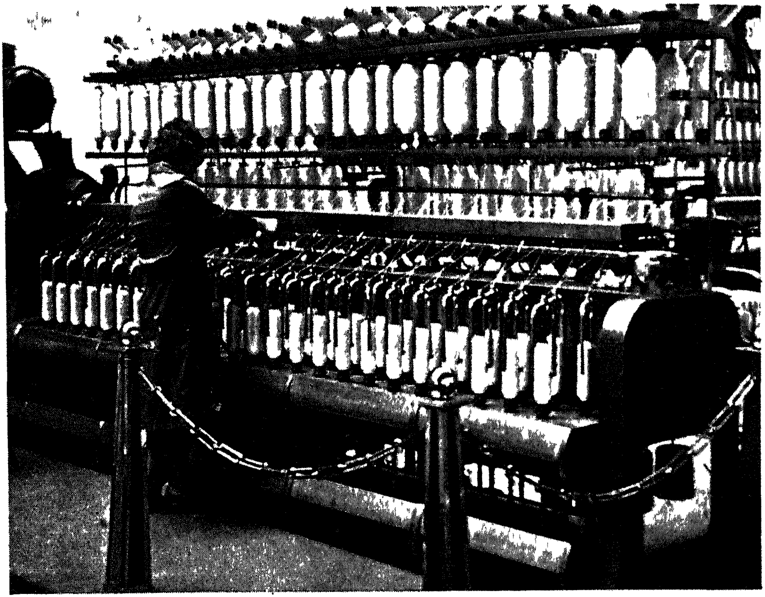
The bales of raw cotton which pass along the Canal on the last stage of their journey from the United States, India, or Egypt are unloaded at Manchester and sent to one of the spinning-mills in the south of Lancashire.

The first things we notice on stepping inside the spinning-mill are the leather belts which pass downwards from the revolving power-shaft just under the roof, and the rows of white bobbins about a foot high. The belts drive the spinning-machines which stand in rows on the clean, shining floor of the mill. Many machines are thus driven by one power-shaft, and, by disengaging a belt, it is an easy matter to stop any particular machine for repairs. We could stand for hours and watch these machines at work. They seem actually to know what they are doing. One machine combs out the short, silky fibres, while another one twists them together to make a long, fine thread of spun cotton.

Throughout all the processes of spinning, the keen-eyed operatives maintain a constant watch for broken threads. Any broken thread must be " pieced " immediately. The thread which we see being wound on large spools is much finer than the cotton your mother buys on a reel. It is sometimes so fine that 20 miles of it weigh only one pound!

The thread is sent to a weaving factory, or " shed ", in one of the more northerly towns on the Lancashire coalfield. In the weaving-shed we see another maze of moving belts, working machines which are so uncannily clever at weaving the threads into cloth that we feel that they, too, must be possessed of human skill.

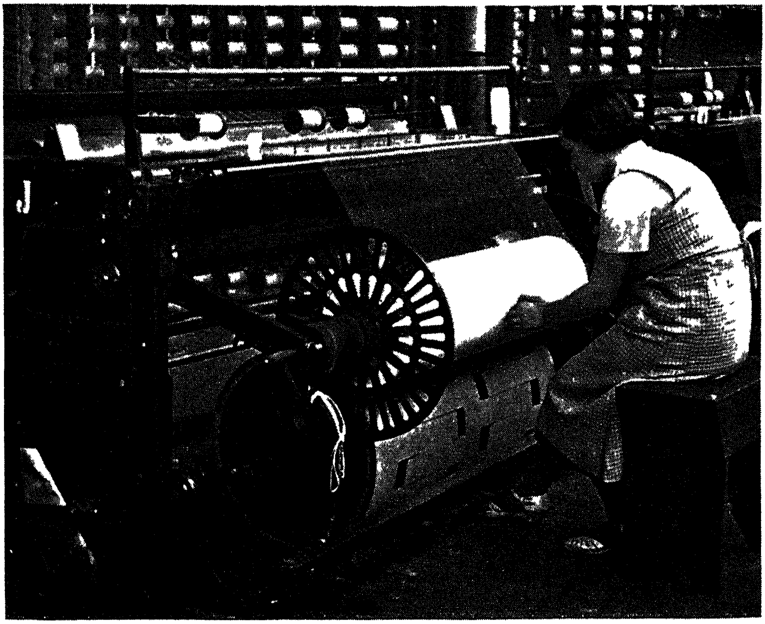
The woven cloth is dyed a certain colour or printed with a certain pattern, and is then ready for



THE SPINNING FRAME NOTICE THE SPOOLS OF FINE THREAD

market, where it will be bought by a manufacturer of shirts, dresses, sheets, or curtains. The merchant will export most of the cotton goods he makes, for one of the strangest parts of the story of cotton is that, after being brought to Lancashire as raw material from Eastern countries, it is sent back to the selfsame countries in manufactured form.

We could also see the important work of cotton-spinning and weaving carried on in similar factories at Glasgow and Paisley in Scotland. It is, however, in Lancashire that most of Britain's cotton-cloth is



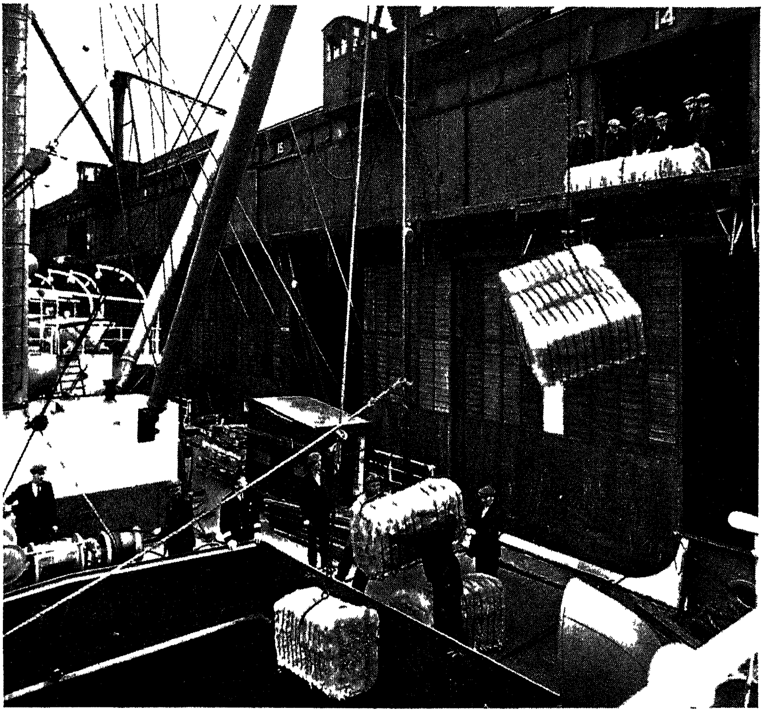
THE BEAMER OR WARPER AT WORK

produced, and there are many good reasons to account for this.

The people of Lancashire were the first in Britain to use cotton for weaving. They used simple hand looms for this purpose more than three hundred years ago. The cotton they used had to make the long and perilous journey from the East, and most other cloth-makers in those early days used wool or flax, which were much more easily obtained. It is not surprising, therefore, that Lancashire people came to understand cotton, and how to weave it, better than their fellow-countrymen, and that most of the inventions that have led to the marvellous machines of to-day should have been made by natives of this great cotton county. It has been fortunate for Lancashire, too, that there has always been at hand a plentiful supply of power. In the earlier days the rapid streams from the Pennines supplied the factories with water power, and since the introduction of steam-power, coal from the Lancashire coalfield has been used.

We have said that the operatives in the mills are always on the watch for broken threads. Cotton-spinning and weaving cannot be carried on in a dry atmosphere, for the threads would be constantly snapping. This is another reason why this industry has flourished in Lancashire, for the country lies directly in the path of the moist south-westerly winds, which, we know, are the prevailing winds in Britain. It is very interesting to learn that the Lancashire weavers can often tell when the wind changes into the dry east by the increase in the number of thread " snappings ".

The great port of Liverpool, the " sea-gateway " of Lancashire facing the Atlantic, is in a very convenient position for trade in the raw material from the cotton-lands of North America. We must not forget, though, that to-day Lancashire imports all



BALES OF COTTON BEING UNLOADED AT LIVERPOOL FROM WHICH COUNTRY MIGHT THE SHIP HAVE COME?

the cotton that is grown in Egypt, and, in addition, some from India.

Even Blackpool, the famous seaside resort of the cotton county, is indirectly involved in the great industry, for it is to this town that the majority of the cotton workers go for their annual week's holiday. Each large town in the county has its own "wakes week", and closes its factories while the workers enjoy themselves beside the sea. Blackpool and the other resorts would not be able to accommodate all the workers of Lancashire at the same time, and so we have the amazing sight of thousands of people, who live and work together in one town, going off together for their holiday at the same time, and, mainly, to the same place.

The people of Lancashire are just as care-free and gay on holiday as they are industrious and persevering in their work, and it is because they work hard, and because they have made cotton the special object of their endeavours, that they have given their county such an important place in the life and work of Great Britain.

## QUESTIONS

1. From which countries does Lancashire get its raw cotton?
2 Give the reasons why Lancashire is the chief cotton-manufacturing district in Britain.

## EXERCISES

1. Draw a map of Lancashire, and mark: (*a*) three spinning and three weaving towns (put S or W after the names); (*b*) Liverpool, (*c*) Manchester; (*d*) the Ship Canal, (*e*) Blackpool.
2. Find the distances travelled by cotton goods from Liverpool to Bombay, Alexandria, and Shanghai.

## CHAPTER 9

# WOOL AND OTHER TEXTILES

Have you ever looked at the sleeve of your jacket to see how the threads of wool run? Many of the threads are very long and straight, running from the shoulder right down to the cuff; others go round the sleeve, over and under the long threads to make the cloth strong. And have you ever thought that the wool, when it was cut from the sheep's back, was short and matted? There were no straight threads in it, and certainly no long strands which you could use for making clothes.

The story of the making of the sheep's fleece into woollen cloth takes us back to very early times. Long before the days of mills and machinery, our forefathers discovered that the short pieces of wool could be spun to make long strands, and that the strands could be woven to make cloth. Woollen weaving was carried on wherever sheep were reared, the weaving at first being done by hand in the homes of the people. In many parts of the world women still work with their hands to make cloth on rough, home-made frames. In the Outer Hebrides of Scotland

CARDING AND SPINNING BEING DONE BY CROFTERS IN THE HEBRIDES

even to-day the crofters weave their serviceable homespun and home-dyed " Harris Tweeds ".

In thickly populated countries, however, like the mainland of Britain, wool is now woven in factories. So much cloth is made by the thousands of workers, that our home-bred sheep can supply only a small part of the raw material required, and thousands of bales of wool are brought to Britain from other parts of the Empire. A strong link is thus formed between British people working in the mills at home, and the men who rear their millions of sheep on the wide plains of Australia. Tightly packed bales of imported wool from Australia, New Zealand, and South Africa may be seen, any day, swinging from the lofty electric cranes in the docks of London and Hull.

The bales are stacked by mechanical loaders, ready to be transported by heavy horse-drawn wagons or powerful lorries to the wool sales in London or Bradford. There the wool is sold by auction, and taken to the various wool-manufacturing towns. Most of the imported wool finds its way into the West Riding of Yorkshire, where the longer, finer grades are made into the superior *worsted* cloth of Leeds and Bradford, while the poorer grades are used for the heavier *woollens* of Huddersfield and Dewsbury.

When you think that wool is used for a great variety of articles—clothing for men, women, and children, uniforms, carpets, and blankets, you will understand that all these articles cannot be successfully made in one district. Many towns specialize in the making of one or two kinds of woollen fabric, and buy special grades of wool suitable for their particular work. Leeds, for example, on the River Aire, besides manufacturing worsteds, is the chief market centre for the industry, and also specializes in ready-made clothes. A strange industry is carried on in a few towns, like Dewsbury and Batley. Here old cloth is bought, pulled to pieces by machinery, and woven again to make a cheap kind of new cloth called "shoddy".

For whatever purpose the wool is to be used every strand of it has to be dyed. The larger factories in every town are equipped to carry out all the processes necessary, from receiving the raw wool to the dispatching of the finished articles, but Bradford is a special centre for dyeing.

The establishment of the important woollen industry in the West Riding of Yorkshire was determined by geographical conditions. The Pennines were noted for sheep rearing, while the many streams provided excellent water suitable for cleansing and dyeing the wool, and, in earlier times, for driving the machinery. Later, these streams also turned the water-wheels which provided the power for the earliest mills. Later still, when steam-driven machinery was introduced, and coal and iron became necessary, it was fortunate that both coal and iron were found close at hand. It was therefore possible for the industry to be carried on in the same district as when water-power was used.

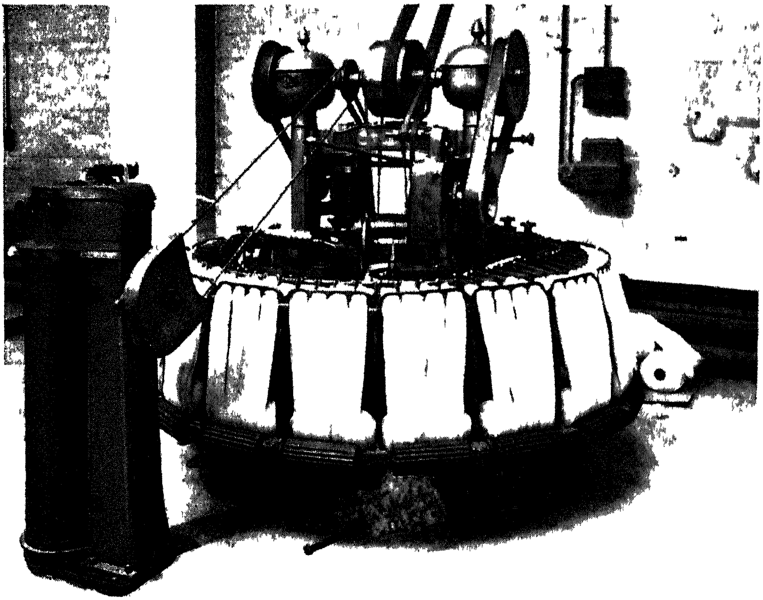
The gently rolling pastures of the Cotswold Hills, again with an abundant water-supply, led to the early development of a very fine woollen cloth manufacture in the West of England. In Wiltshire, in the towns of Stroud and Bradford-on-Avon, is still made the fine, smooth cloth used on billiard-tables. Witney, in Oxfordshire, makes the finest fleecy blankets.

In Scotland, the dry eastern slopes of the Southern Uplands have always supported many sheep, and the towns of Hawick, Galashiels, and Selkirk make tweed cloth, in spite of the keen competition of the larger woollen towns in Yorkshire. Wales, too, has always been a sheep-rearing country, and Montgomery and Welshpool, near the source of the Severn, have long been famous for blankets.

So far we have dealt with those woollen articles which are woven, but many are knitted. In the large factories of Leicester and Nottingham, thousands of girls work elaborate knitting machines turning out warm woollen clothing for women and children.

We see, then, that the woollen industry is carried on in many parts of Britain, and that the manufactures are of many different kinds. There is always, however, the problem of making long strands from the short, tangled wool of the sheep's fleece. If you have never visited a factory, you can have no idea of the size and number of the wheels, rollers, and moving belts which help in the production of woolly threads long enough and strong enough to be woven.

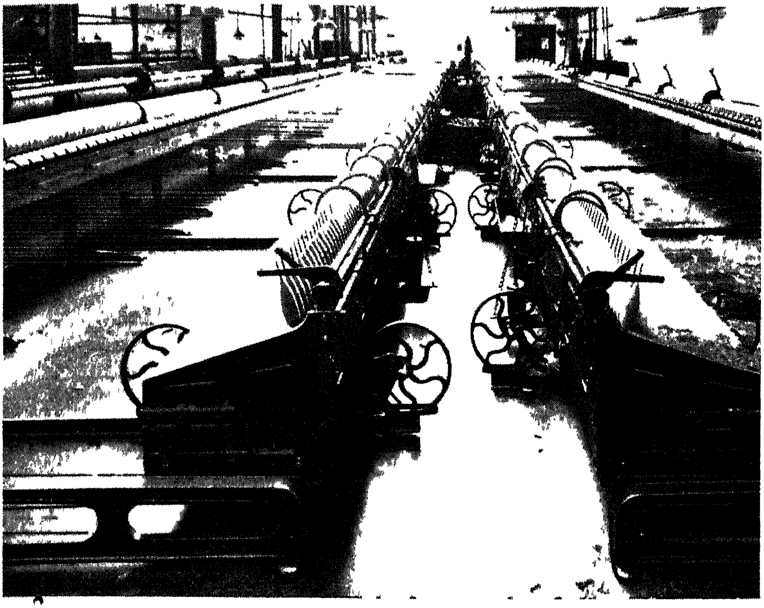
The first machine " scours " or cleans the raw wool. Dyeing next takes place, and then the blending



A WORSTED COMBING MACHINE AT WORK

of the various colours. Another machine " willeys ", or loosens, the fibres while wool oil is constantly sprayed on to them to make them slip easily over one another. A " scribbling " machine next separates the threads and straightens them out on to revolving cylinders. By this time the miracle has taken place — the short, grey wool has been made into long, coloured, soft " yarn ", and wound on to large bobbins.

By one more machine, a " mule ", or spinning-machine, the yarn is twisted round at a very high



A SPINNING MULE IN A LARGE WOOLLEN MILL

speed until the thread becomes strong enough for weaving. If cloth is to be made, it is woven on looms on which long threads are stretched from top to bottom while short ones pass over and under from side to side to make the cloth as firm as you see it in your coat-sleeve. The material is still very greasy and rough, and several other processes have to be gone through before the cloth is " finished " and ready to be rolled and packed into bales or cases for transport.

Britain, rich in coal and iron, leads the way in the making of the marvellous spinning and weaving machines. Her work-people are skilful and industrious, and vast amounts of British cloth of recognized good quality are sent to all parts of the world.

While we are thinking of spinning and weaving, we should remember that there are woven articles which are made from other materials than wool. Cotton, silk, linen, jute, and hemp are other British "textile" industries. With the extremely important cotton industry we have dealt in another chapter. Silk manufacture is of great interest to us to-day, for we are living at a time when the whole industry is changing. In many shop windows we see silk articles displayed, but most of these are made from rayon, or artificial silk. They are not made from fibres spun by silk-worms, but from wood-pulp. Many cotton and woollen firms have taken up this new industry, and Britain now exports three times as much artificial silk as real silk. Raw silk is imported from far-away countries like China and Japan, while the wood-pulp for artificial silk is much more easily obtained from countries nearer home. Real silk, however, is still woven in Britain in those counties which lie just south of the Pennine Chain — Cheshire, Derbyshire, Nottinghamshire, and Leicestershire.

Linen is woven from flax in Dundee and Dunfermline in Scotland, but the chief home of the industry is in Northern Ireland. Linen yarn is spun

MAKING A WARP OF RAYON. THE THREADS ARE DRAWN FROM THE BOBBINS THROUGH A FINE COMB TO THE REVOLVING CIRCULAR FRAME WHICH YOU SEE IN THE BACKGROUND.

from the fibres of the flax plant, and the climate of Northern Ireland, warm and temperate, with good rainfall, aids the growth of the best kind of flax. A very attractive sight in Ireland is a broad waving field of flax. Each slender stem, between two and three feet in height, bears a pale blue flower, and the wind moving over a field of flax causes it to resemble a gently moving sea. When the flowers begin to droop, and the leaves turn yellowish, the harvesting of the plants is begun. All flax plants grown for fibre are pulled up by the roots, tied together in small bundles, and submerged in specially prepared ponds. This " retting ", or steeping in water, goes on for ten or twelve days, until the fibres can be easily stripped from the stalks.

The stalks are then stood up in fields in sheaves, or stooks, to dry, after which the upper-ends are passed between carefully set rollers which break the seed-pods without damaging the seed. This seed may be cleaned and polished, or it may be crushed to give linseed oil, and a residue, called oil-cake, which serves as a valuable food for cattle.

The stalks are taken to a scutching-mill, where the woody matter is scraped from the fibre, making them as clean as possible before they go to the spinning-mill. Yarns are spun of various qualities, and woven into the many kinds of linen goods for which Belfast and the neighbouring towns are famous. Visitors to the north of Ireland are often interested to see a bleaching-field, where very long wide strips of linen are laid out across the grass to be bleached in the open air.

To-day there are so many mills in Belfast that Ireland itself cannot supply all the raw material needed. Ships laden with flax plants from Belgium

PUTTING FLAX INTO THE " RETTING POND "

and the countries bordering the Baltic Sea sail into Belfast harbour, meeting on their way others bearing away to England and America finished articles of Irish linen, the finest linen in the world.

Jute is another plant which yields fibres for a British textile industry. Jute is very different from flax, growing to a height of from 10 to 12 feet in the wet, tropical land of the Ganges delta. The fibres are separated by " retting " as in the case of flax, but the yarn can never be used to make a fine fabric like linen. Much raw jute is shipped from Calcutta to

Dundee, where it is woven into a coarse, but strong, brown cloth used for wrapping bales of raw cotton and wool, and for the making of sacking of every kind.

Hemp is another plant which gives fibres for weaving. Its stems are "retted" like those of flax and jute, but they have to be more thoroughly dried, being spread out in rows on grass to bleach for three weeks, and turned over constantly with a light, long pole. The hemp fibre is tough and strong and particularly adapted for weaving into coarse fabrics (some sail-cloth or canvas used to be made of hemp), and for twisting into ropes and cables. The finer sorts are used for sheetings and heavier quality shirts, as they are capable of being bleached, and are stronger than flax.

There is so much weaving carried on in Britain that you will very likely find in your own district mills spinning or weaving some of the yarns mentioned in this chapter.

## QUESTIONS

1. What conditions favour the wool industry?
2. In what parts of Britain are linen, silk, artificial silk, and jute manufactured? Where are the raw materials obtained in each case?

## EXERCISES

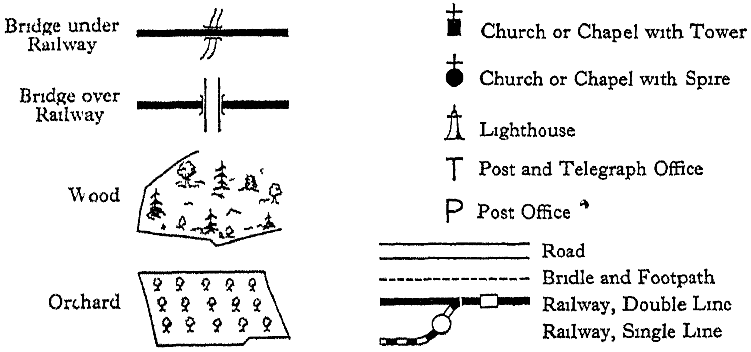
1. Britain's annual imports of raw cotton are worth 40 million pounds. Her exports of cotton are worth 60 million pounds. The values for wool are: 40 million pounds (imports) and 30 million pounds (exports).

   Draw rectangles to scale to illustrate these figures. Can you account for the difference in the exports?
2. Find the distances travelled by wool to London from Melbourne, Wellington, Cape Town, and Buenos Aires.

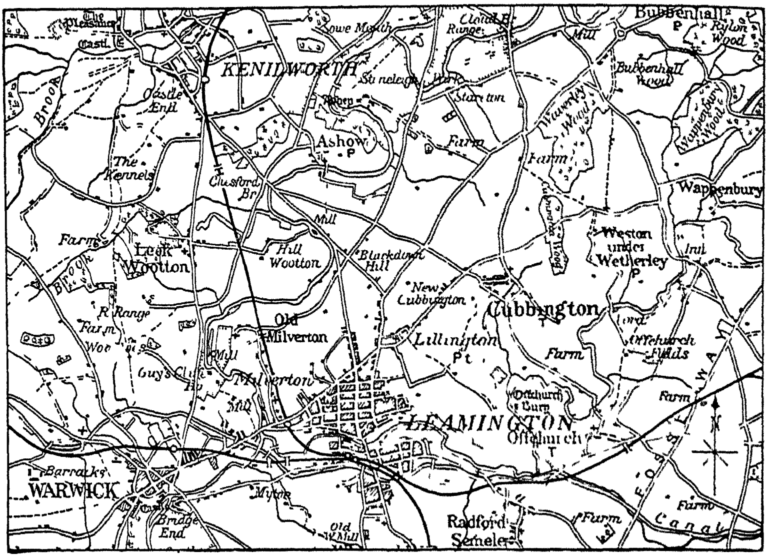
## READING A LOCAL MAP

If a map is to show details, such as roads, streets, forest-land, and churches, a large scale has to be used. The Government has made detailed maps, called Ordnance Survey maps, of every part of Britain. The largest scale used is 6 inches to 1 mile, and such a map would show even the houses.

Here are some of the Ordnance Survey signs used by the Government.



Here is an Ordnance Survey map of Warwick and district, drawn to a scale of ½ inch to 1 mile



*Exercises.*

1. Which town lies north of Warwick, and which east?
2. What is the name of the wood through which a road passes?
3. Which villages have telegraph offices?
4. Near what town does a railway pass under two bridges which are less than ½ mile apart?
5. How far is it by rail from Leamington to Kenilworth?
6 Describe what you would see if you walked from Warwick to Leamington.

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Draw a map of the district around your school, using the signs given on p. 129.

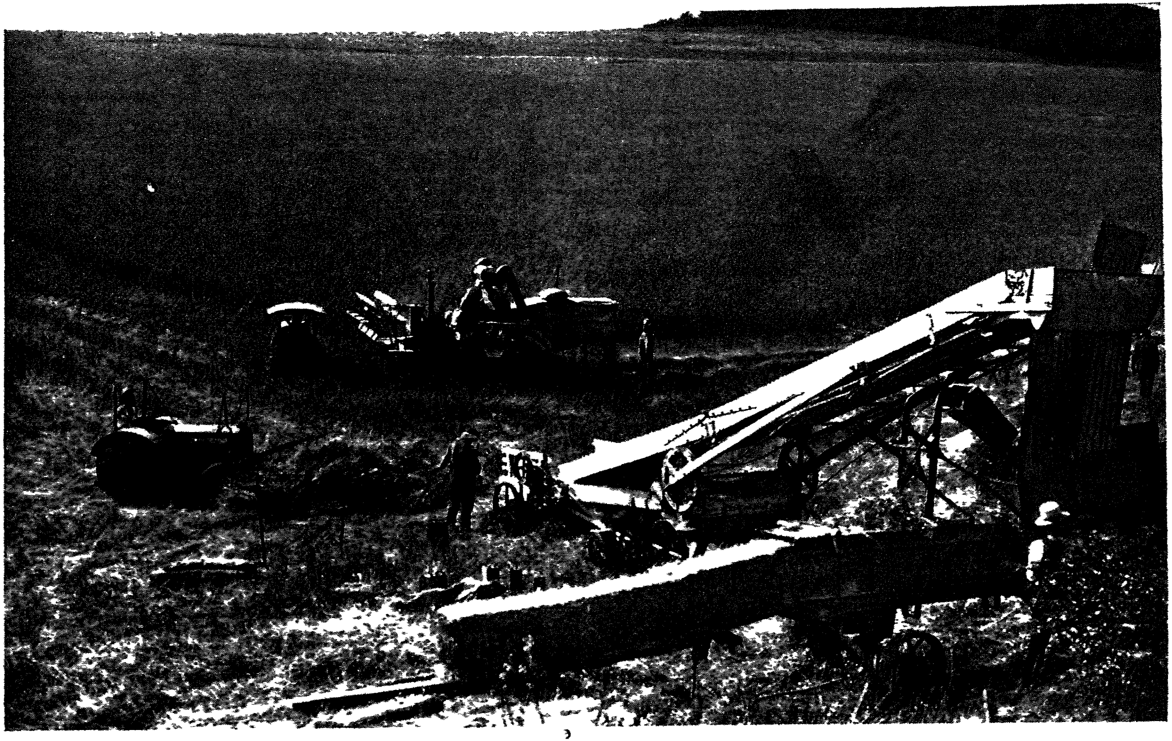
## CHAPTER 10

# FARMLANDS

Would any of you refuse to come for a holiday on a farm? What fun it would be to help to bring in the cows at milking-time, to move the sheep into fresh pasture, to work in a hay-field, or to help at seed-time or harvest! All these things, and many more, would make a farm holiday very enjoyable. But it is becoming more and more difficult every year to find one farm where you could do all these things.

The great changes which have taken place in every industry have affected farming. The very expensive machinery required to turn out huge quantities of articles of a high standard has made it necessary for most manufacturers to make one class of goods only, and to make that well. All the people engaged in one district find it better to learn all they can about one kind of article, or even only a part of one article, and to buy the latest type of machine to make that part better than their competitors can make it, and at a cheaper rate.

Fast ships and railways bring to all countries the



THE "COMBINE-HARVESTER" AT WORK ON A WHEAT FARM goods of other nations in ever-increasing quantities, and towns or countries that tried to make everything would be unable to compete with those that brought one article to perfection. So the workers of the world are rapidly becoming "one-article men", working with very exact machines to make articles of one standard pattern, and buying at a cheaper price the other things they used to make. This method of work is called standardization or specialization, that is, making things *to standard* or pattern, or making *special* things. People who work in this way may still make other articles in their spare time, but these will be for their own use, and not for sale.

So it is with farming. It would be difficult to find one farm on which large quantities of corn were grown and large numbers of sheep, cattle, poultry, and pigs were reared at the same time. Other countries, with more suitable climates and more land, have specialized in the growth of one particular article, and if the farmer is to "make a do of things", he, too, must find the crop or animal his farm is best suited for, and work hard to produce that crop or animal on a large scale. He may still do a little mixed farming, but the produce will be mainly for the use of his own family.

Thus a Wiltshire farmer will not see the wide, waving fields of corn he used to see from his bed-room windows; most of his land will be under grass, and he will gain a living from rearing dairy cattle. He will leave corn-growing to his cousin in Suffolk or Essex. Similarly, Yorkshire farmers will rear sheep, while the farmer in Lincolnshire will sow sugar-beet. Even so, the farmers of England will find it hard to compete with those in the broad lands of Canada, Australia, and the Argentine, and they will probably specialize still further by producing such things as Cheddar cheese, York hams, and Wiltshire bacon, which are always sure of a market because of their particular quality. Climate and soil and the nearness to a market will decide in favour of dairy cattle, wheat, sheep, pigs, apples, hops, vegetables, or even tulips.

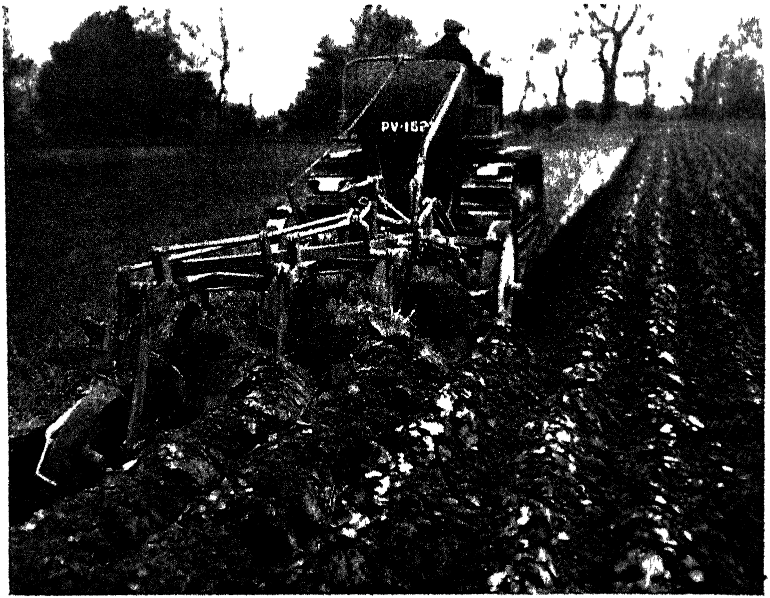
As we journey through Britain, therefore, we shall find changes of scene, and we shall understand what each scene means to the farmer whose land we are visiting.

Let us go first to a wheat farm. If we are in England, we shall most probably find ourselves in East Anglia, that is in Essex, Suffolk, or Norfolk; if in Scotland, in the Lothians, along the southern shores of the Firth of Forth. To grow good wheat a farmer needs a rich, firm soil. The climate must be wet enough in Winter and Spring to cause the grain to sprout and grow, but it must be hot and dry enough in Summer and early Autumn to ripen the corn and make it hard. Good, firm soil, and rain and heat at the right time, are found in the districts we have mentioned.

As we travel through Britain, we shall see wheat-fields in other parts, but the wheat grown there will not be so suitable for making bread. Near Reading and Edinburgh, for example, wheat is grown for biscuit-making. On any wheat farm to-day we shall see, either resting in the sheds or working on the fields, those modern machines which are the signs of specialization. The " combine-harvester " can cut and thresh, and put straight into sacks the wheat from a 12-foot strip, reaping 50 acres a day.

In many level districts the motor-tractor has almost displaced the old horse plough, and wheat is sown a dozen rows at a time by motor drills. There is still need, however, for the smaller tools, such as scythes, hoes, forks, and spades, in those parts of the fields where the more modern implements cannot be used. In hilly or uneven land, too, the horse plough must still be used. British farms are small compared with those of Canada and Australia, and every piece of land must be cultivated.

We shall see, too, that the farmer is being helped by the discoveries of modern science. Chemical sprays are at hand to kill the insect pests; artificial



A 3-FURROW PLOUGH DRAWN BY A TRACTOR

manure is spread over or dug into the surface to improve the soil. The scientist has also taught the farmer how to " rotate " his crops, that is, to vary the crop from year to year so as not to impoverish the soil. An up-to-date farmer is in touch with the scientific, experimental farms run by the Government to try the effect of different chemicals and soils on plants and insects.

He can, in fact, obtain help from practical scientists to deal with every difficulty he may meet. When the crop is ready for market, telephone and telegraph messages advise the farmer which is the best market to use at that particular time, and his reliable motor lorries stand ready to convey the crop in time to " catch the market ".

If we arrive on a British wheat farm during the winter, we shall see most of the land looking barren and bare. The land has been ploughed over in the autumn after the harvest has been reached, and we may think that nothing more has been done. In fact, the seed for next year has already been sown. The ground has been well rolled on to the seed, which lies safe underground ready to shoot up when the warm spring arrives. In our country it may even be helped rather than hindered by the protection and moisture afforded by a white blanket of snow. In countries with colder winters, like Canada, the farmer has to wait until spring before he sows his seed.

In those other parts of the low land where the soil is a little poorer, or the climate cooler, barley is the chief corn crop. If we wish to see a field of " bearded " barley, we shall visit the Midlands of England, the east coastal plains of Scotland, or the warm, dry, south-east of Ireland. Barley was once used for bread-making, but to-day it is grown chiefly to supply the brewers and distillers with malt for their beer and spirits.

More hardy than wheat and barley are oats.

These may be grown even in the colder parts of Britain. In the valleys of Scotland they are the chief crop, and you have no doubt had many a plate of Scotch porridge. But as oats form a large part of the diet of horses and pigs, every farmer tries to find room for a field of oats.

The growing of grain is only one form of agriculture. The soil is also tilled to receive root crops — potatoes, turnips, parsnips, mangolds, and sugar-beet — and to grow beans, peas, vegetables, and even flowers. Dairy-farmers, on the other hand, do not disturb the soil, while fruit-farmers plough only the ground between the rows of trees.

Root crops are very interesting. Have you ever thought that you do not eat the plants themselves, but the " roots " which remain in the ground after the plants have died down? Potatoes are an important food in most homes in Great Britain, and especially in Ireland. Potato growers select one of the many kinds of potatoes to suit the soil in their district, and on the open lands around all the towns of Britain the potato does well.

As turnips and mangolds are valuable winter food for cattle and sheep, you will often find fields of these crops near cattle-farms. Travelling along the roads near the Fen District you will see piled-up lorries of sugar-beet. This root, which is white and long

SORTING AND PACKING POTATOES FOR THE LONDON MARKET

like a big parsnip, grows best in Lincolnshire. The Government is subsidizing the farmers and the owners of sugar factories, because it is good for Britain to produce its own sugar instead of importing it.

All round our large towns you will see small fields of cabbages, beans, and peas. These "market-gardens" supply fresh vegetables for the tables of the town dwellers. The level land of the Thames basin, of Cheshire and Lancashire, of the Vale of Evesham, and of Kent hold the chief market-gardens of Britain. In Cornwall and the Scilly Isles, in the warm, moist south-west, winter is short and "early" vegetables and flowers are brought in a few hours by fast trains to London where they fetch a good price.

With all these crops, only one quarter of the land is used for agriculture. But more than half of Britain is grazing ground for cattle and sheep. This varies from the rich grasslands of Ireland and the green meadows of the English lowlands to the heather-covered Scottish moorlands.

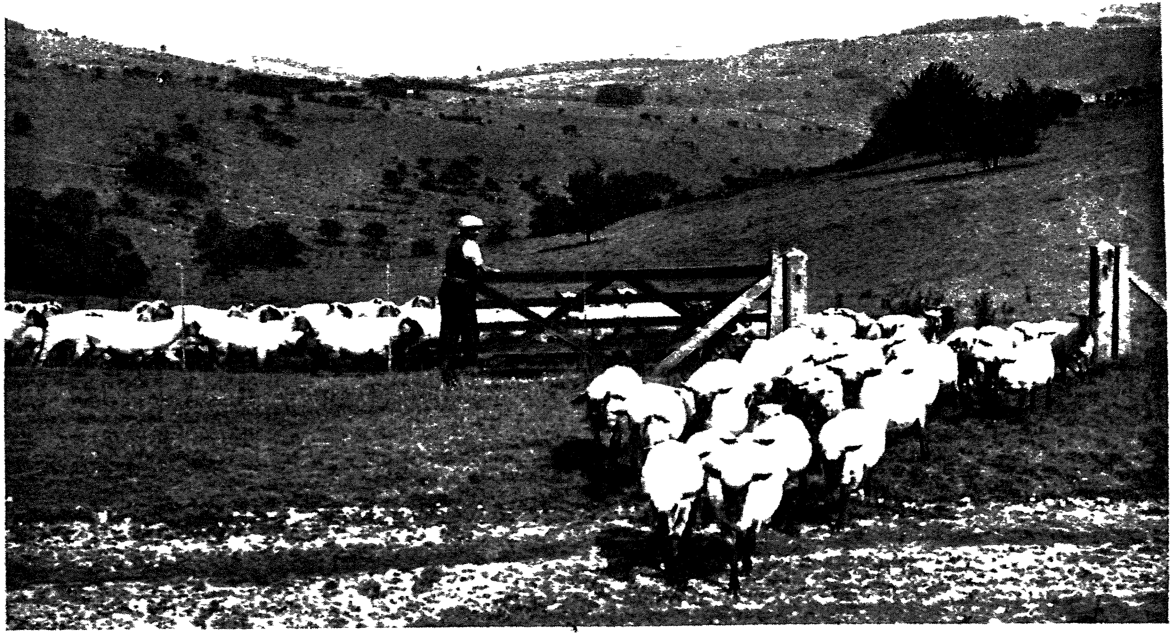
British beef is famous all over the world, and although the butcher may sell more foreign meat, there is no beef to better our own for flavour. Farmers in the Empire and in foreign countries use British cattle from which to raise their own herds. Devons and Herefords, famous English breeds, are now found in large numbers in our colonies. Their names give you the clue to two important cattle districts in England. There are also several famous breeds of Scottish cattle, notably Aberdeen-Angus.

British breeds of dairy-cattle are also world famous, and you find Sussex, Jersey, and Ayrshire cows in all the dairying countries. The rich meadows of Britain are fine pastures for dairy cattle, whereas beef cattle feed on the drier fields of the lower hill slopes. You have heard of Irish butter. The chief dairying regions of the British Isles are found in the west of Britain, where the plentiful rainfall encourages the growth of rich grass. Perhaps you have been lucky enough to taste Irish butter, Devonshire cream, or Cheddar cheese.

London gets most of its milk from the great Vale of Aylesbury, which lies to the north of the Chiltern Hills. Milk is such a valuable food for people of all ages that the Government is urging children in schools and parents at home to drink more milk. The Milk Marketing Board is carrying out an enormous task in collecting, purifying, and delivering all the milk produced in Britain.

Fortunately for the farmer, sheep do not thrive in the lowland meadows where he keeps his cattle. The hillsides and the rolling downlands with their carpet of short closely-knit turf provide the best pasture for sheep. The best mutton comes from sheep reared on the damp hillside, the best wool from sheep of the drier moorland. Perhaps you have heard of the South Downs, Lincolns, and Leicesters of England, and the Cheviots and Blackfaces of Scotland. If you call to mind the centres of woollen manufactures in Britain you may be sure that there are still thousands of sheep on the hillsides in those districts.

It is a stirring sight to see the shepherds and sheep-dogs rounding up the large flocks on rough hill pastures of Wales or Scotland. Just as a Scotsman is proud of his beef, so it is hard to shake a



SHEEP ON THE BERKSHIRE DOWNS CHANGING TO A NEW PASTURE

Welshman's belief that Welsh mutton is the tastiest meat in the world.

If you visit any sheep-rearing areas at lambing-time you will find that the shepherd's life is then a particularly busy one. In Dorset, lambs are born as early as December, in the north from April onwards. In each case the weather is still unsettled, and the shepherd has to tend his flock unceasingly if he is not to lose his lambs through the cold.

British pig-keepers and poultry farmers have felt foreign competition very keenly. About nine-tenths of the bacon which the British eat comes from Denmark, where pig-farming is run as a scientific industry. Steps are now being taken by the Pig Marketing Board to set up a similar industry in our own country. In the old days English bacon came from the sty in the countryman's cottage garden. When the pig which had been fed on scraps of all sorts was fat enough, it was sent to the local pig-killer. It is seldom, to-day, that pigs are reared in this manner. Most of our pigs are on specialized pig-farms which have been started with the help of the Government. Bacon factories have been built in most of the industrial areas, where pigs are "cured" at the rate of 600 a day. British pork and hams are still, however, more important than British bacon.

A great change has also taken place in poultry-keeping. The farmer's wife used to keep the fowls in the farmyard and collect the eggs from under wagons or from odd corners in the barns. Eggs by the million were imported from abroad — from Denmark, Australia — and even China! Ireland followed the Danish example and built up a flourishing export trade of dairy produce to England. England itself is now organizing great poultry farms. Thousands of eggs are sent to large egg-packing stations, such as those owned by the National Mark Produce Scheme. There they are cleaned, graded, stamped with the National Mark, and sent on to the shops.

As a result of all these farming activities, there is need for market-towns, and your own local market-town is well worth a visit on market-day. You will gain some idea of the specialized farming in your district. Besides the farm produce displayed for sale, you will probably see up-to-date farming machinery and fertilizers used on the fields near your home.

## QUESTIONS

1. How does the scientist help the farmer?
2. What conditions favour the growth of wheat, barley, and oats? In what parts of Britain are these crops grown?
3. Where are the chief sheep pastures and the chief cattle pastures in Britain?

A LARGE POULTRY FARM ON THE WILTSHIRE DOWNS

## EXERCISES

1. Draw a rough map of the British Isles and on it shade one district well known for each of the following: wheat, barley, oats, potatoes, lamb, dairy produce.
2. Britain grows 10 million pounds' worth of wheat a year, and imports 60 million pounds' worth. Draw rectangles to compare the amounts of home-grown and imported wheat.

## DAY AND NIGHT

1. From a newspaper, find, and enter in your notebook, the times of sunrise and sunset each day for a week. By how much does the length of each day alter? Are you approaching the longest or the shortest day of the year? Find out when these two days are.

2. From a diary, or from some other source, find the times of sunrise and sunset on the 21st of each month. Work out the length of each of the 12 days. Are any of the lengths almost the same? In which months are the lengths of day and night equal (12 hours each)?

## CHAPTER 11

# ORCHARDS AND HOPFIELDS

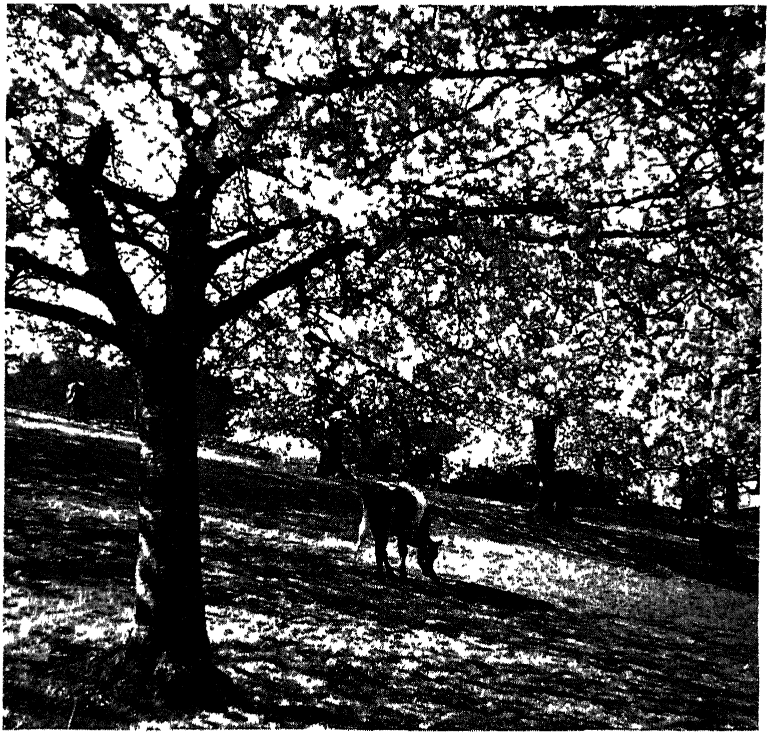
Would you be surprised to see two strong horses pulling a plough between the rows of trees in an apple-orchard? This is a common sight in fruit districts, where the soil tends to become hard and stale unless it is turned over.

Most likely you know that fruit trees are planted in lines with a good space between the rows, so that every tree can get its full share of sun and air, but this alone is not sufficient to produce large, juicy fruit. In some districts the ground between the trees must be well broken up to let air into the soil, and to enable the rain to soak through to the roots. Pears, cherries, and plums are often improved if the ploughshare is used to admit air and rain. Some orchards, however, have grass beneath the trees. It is not necessary then to plough the ground, as the soil is generally very good and quite able to soak up enough moisture to keep the trees healthy. In such orchards sheep are turned out to graze.

Ploughing is only a small part of the work necessary before a farmer can hope to see a good crop of fruit. The trees themselves are often attacked by diseases and insect pests. One fungus will destroy the bark, another, called "Black Spot", will crack the fruit, caterpillars will eat the leaves, and flies bore into the fruit. To overcome these troubles the trees must be sprayed with chemical. You would be surprised if you saw what took place during the winter months. Hundreds of feet of stout hose-pipe, leading from large tanks, lie winding about between the trees. Each hose is attended by a strangely dressed gardener wearing a thick sack, heavy gloves, and a wide-brimmed hat. By means of his "lance", a huge nozzle about five feet long, each gardener sprays the trees nearest to him, keeping himself well out of the reach of the dangerous spray. The fluid is pumped through the pipes by a small motor. The spraying takes place in winter because then the tender leaves and flowers are packed tightly away inside their buds.

When spring comes round and the trees are covered with blossom, the trees are again sprayed, this time with a weaker mixture, which will kill the caterpillars and flies but not harm the foliage.

Around the trunks of some trees, especially cherry trees, wide, sticky, paper bands like huge fly-papers are fastened to catch those pests which crawl up the bark. You see how careful the farmer is to protect the fruit from every kind of enemy.



A CHERRY ORCHARD IN WORCESTERSHIRE

Even ploughing and spraying are not enough. The trees have to be pruned. Branches which keep out the light, or become too old to bear fruit, have to be cut off during the autumn. If, after all this work, the fruit farmer is lucky enough to get a good crop, he hires men and women to act as pickers. Much harm can be done to the fruit and to next year's crop if these persons are unskilled or careless. In many fruit-growing areas there are agricultural colleges attended by boys and girls, Britain's farmers of to-morrow, who learn to supervise the workers on our farms.

The first British fruit crop to ripen are cherries, the picking of which begins towards the end of June. If you travelled across Kent several weeks before this time, you would be delighted by the magnificent sight of cherry trees smothered with white blossom. If you prolonged your stay in Kent, you would see the even more wonderful sight of apple trees bearing masses of pretty pink and white flowers. In fact, by visiting Kent, which is sometimes called the "Garden of England", you would see plantations of all kinds of British fruit. The fruit lands of this south-eastern county of England are not only in the warmer part of Britain, but they have a rich soil and are sheltered from the cold northerly winds by the North Downs. Many fruit plants are very delicate, and you will find that all the chief fruit areas of our land are sheltered by hills as Kent is.

Most fruit-growing districts are famous for one special crop. Just as parts of Kent are famous for cherries, so the Vale of Evesham is noted for plums and apples, while Devon and Somerset grow a special kind of apple which is used for making cider. The Scottish fruit areas, of which the Carse of Gowrie is the chief, specialize in growing small fruit, like raspberries and strawberries. In Lanarkshire, in the Clyde Valley, are great areas of " hot houses ", where fine tomatoes are grown.

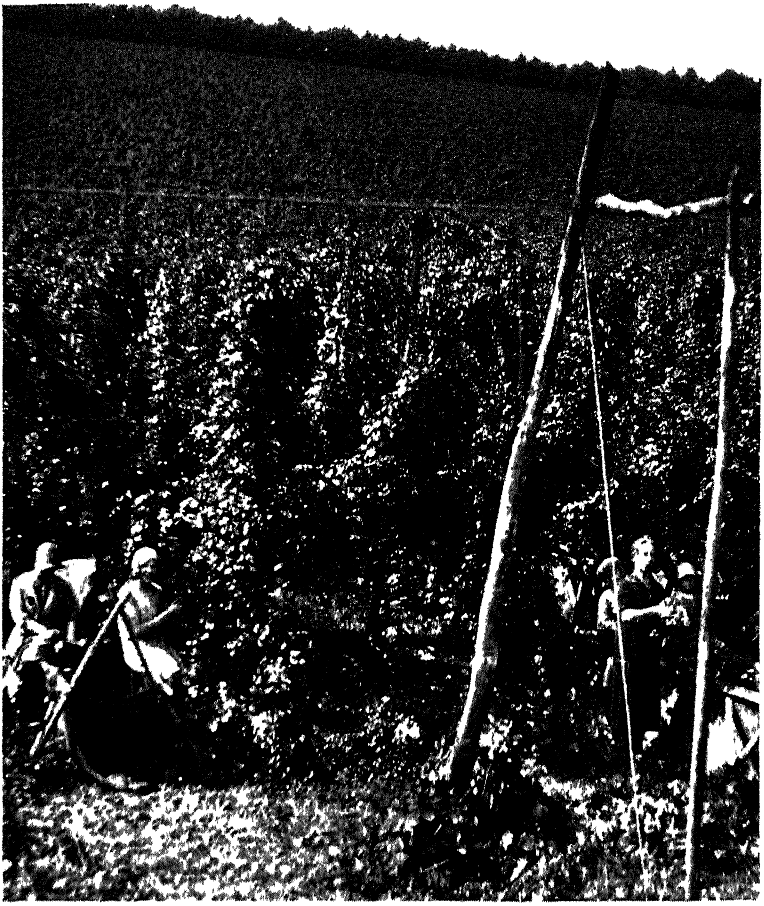
In the county of Kent conditions are so favourable for fruit cultivation, that during the picking season we see people at work collecting all kinds of fruit. To gather cherries, apples, or pears, the pickers use ladders, and put the fruit into canvas bags hanging from their shoulders. The bags are emptied into bushel baskets, and are taken to market. Except for the thorns, the picking of bush fruit, like gooseberries, raspberries, and currants, is comparatively simple, but strawberry picking seems to the onlooker to be somewhat tedious. The pickers pass between the rows of the low strawberry plants, stooping continuously and handling the soft fruit with great care.

Although much of the Scottish fruit is used in the Dundee factories for jam-making, and Devon apples are crushed to give cider, most of our fruit is sold in British shops. Kent sends almost all its fruit to Covent Garden Market, the great London clearing-house for fruit, where the fresh-picked produce of the orchards is sold to dealers who dispatch it to shops all over the country.

Let us return to " The Garden of England " to visit the hopfields for which Kent is famous. We see the " stilt-men " walking on the top of fourteen-foot poles, tying the topmost branches of the hop plants to strings and wires stretched between tall supports. The hop is a climbing plant, and the grower therefore makes a network of poles and wires to support the twining stems. The plant is grown for its flowers, which are used in the making of beer, and the hop-grower not only has to plough, spray, manure, and hoe as the fruit farmer does, but he is obliged, also, to surround the hop-garden with a high fence of sacking to prevent the flowers from being blown off by the wind.

Hop-picking starts in September, when thousands of London families leave their homes for a " hopping holiday ". During their two or three weeks' stay in the country, the " hoppers " live in huts near the gardens. They rise early every morning and go into the hopfields to begin the day's picking, many of the mothers nursing their babies while at work. The hop plants are pulled down from the wires, and very quickly the pickers pluck off the egg-shaped flowers and throw them into canvas bins. Every few hours the bins are emptied into ten-bushel bags, which are taken away by horse and cart to the drying-sheds.

These strange-looking structures, which are called oast-houses, are most numerous in Kent, but are also to be seen in great numbers in Hereford and



" HOPPERS " AT WORK IN A KENT HOPFIELD

Worcester, where the warm, sheltered climate and fertile soil favour the growth of hops.

The interior of an oast-house is very interesting. Just where the conical roof begins to slant there is the

" drying-floor ", made of wooden trellis and covered with a hair cloth. The hops are spread out evenly over the cloth, and a fire is built on the ground floor underneath. Now and then a stick of sulphur is put on the fire to give the hops a special flavour. The hot air passes upward through the hops and out at the top of the sloping tower. The chimney which caps the oast-house is like a weathervane, as it constantly turns in the wind so that cold air is unable to blow down on to the warm hops. When the hops are dry, they are packed into long bags, called " pockets ", in which the crops are taken to market to be sold to the brewers.

As you would expect, there are many breweries in Kent, the chief being at Maidstone. Large quantities of the Kentish hops, however, are sent to Burton, where the breweries use the pure water of the Trent for the making of beer.

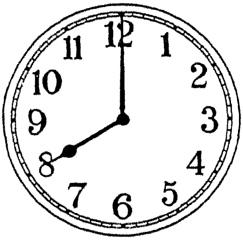
Although they are not so important as fruit and hops, the lovely bulb flowers grown in Lincolnshire, and the early spring flowers grown in the Scilly Isles, are worthy of our attention. The low, wet fields of Lincolnshire, like the similar countryside of Holland, are ablaze in the earlier part of the year with thousands of brightly-coloured tulips. It is the flowers of the Scilly Isles, however, which are the first to gladden the eyes of Londoners after the long winter. These southerly islands receive the benefit of the approaching sun before the rest of our land, and, in the early Spring, trains and even aeroplanes bring cargoes of fragrant blossoms to the capital.

## QUESTIONS

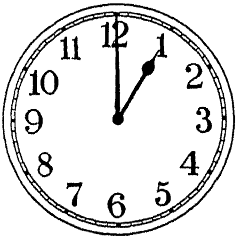
1. How are fruit trees protected against insect pests?
2. What is made from each of the following: apples, strawberries, hops?

## EXERCISE

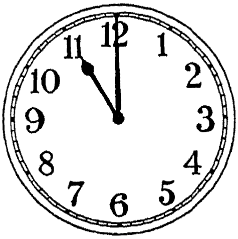
Make a list of all the fruits mentioned in the chapter, and write beside each the name of a district where the fruit is grown.



New York (8 a m )



Britain (1 p m )



Australia (11 p m )

## THE EARTH'S ROTATION AND TIME

While you are having your dinner, children in New York are having their breakfast, and children in Australia are fast asleep in bed.

Clocks in different parts of the world show different hours at the same time, and it is dark in some countries while it is light in others. Why should this be?

The earth is like a big ball spinning from left to right, or from west to east. Countries which are east of our land therefore come into the sunlight before we do. On the other hand, we see the dawn before those countries to our west. New York, far to our west, comes into the sunlight 5 hours after Britain, and its time is 5 hours behind ours. Therefore, when it is 8 a.m. in New York (breakfast-time) it is 1 o'clock in our afternoon (dinner-time) Australia, nearly halfway round the globe to our east, reaches the sunlight 10 hours before Britain. When, therefore, it is dinner-time in our land, Australia has already passed into darkness. On the other hand, while we are in bed, the people of Australia have passed on into another new day This explains why we hear at breakfast-time the broadcast of the scores of a Test Match played in Australia. The match has been played while we have been asleep.

*Exercise*

You have been told that there are 5 hours' difference between London and New York. Measure the distance between these two towns on a ruler, and so find what length represents 1 hour. Use this length to find what time it is in Berlin, Moscow, and Tokio (all east of Britain), and Winnipeg and Vancouver (both west of Britain).

## CHAPTER 12

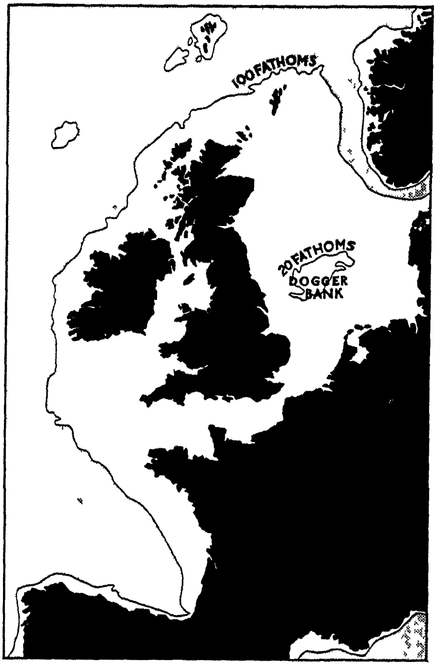
# TRAWLERS AND DRIFTERS

Even on the bleakest and rockiest of Britain's coasts we find fishing villages. From the tiny harbours brave men venture forth in their small boats to wrest from the stormy seas a silver harvest of fish. From the biggest fishing-ports, like Hull, Lowestoft, and Aberdeen, go the great fleets of drifters and trawlers. Next to the Japanese the British are the greatest fishing nation in the world, and in the course of every year the boats of Britain bring in twice as much fish as those of any other country in Europe.

This is only to be expected, because our lands have great natural advantages for fishing. Wherever seas are shallow and fairly warm, as ours are, fish abound in swarming shoals. The waters around our shores are comparatively warm, because Britain is situated in one of the temperate zones of the world. The reason for the shallowness is not so obvious. It happens that our islands stand on a kind of shelf of raised sea-bed, called the Continental Shelf. The floor of the deep Atlantic Ocean rises to a high shelf as it approaches Europe, causing the seas around England and Scotland to be shallow.

A BUSY SCENE AT A LARGE FISHING PORT

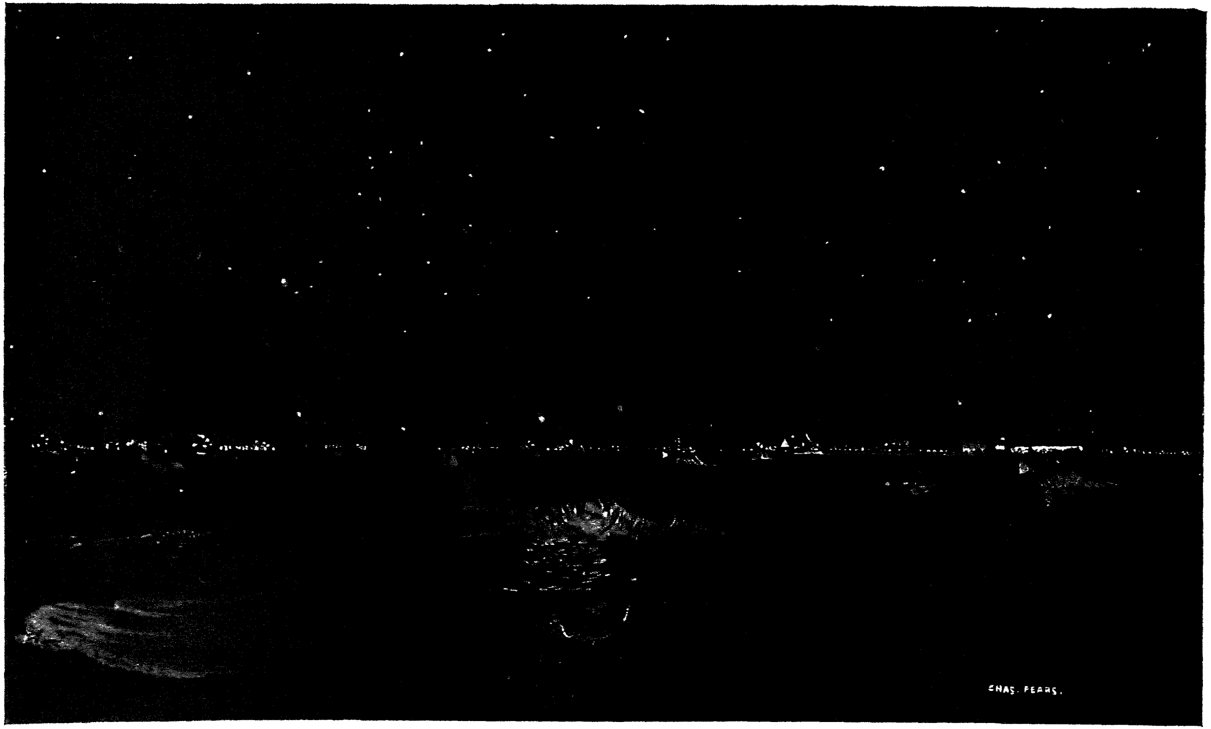
Of all the numerous kinds of fish which teem in British waters the herring is by far the biggest catch. It is a peculiar fish in its habits, preferring to live in the surface waters, and constantly shifting its home as the season changes. The herring fishers therefore need to be very experienced, for they have to spend their life following the herring from ground to ground. The herring season usually starts in the Hebrides and Shetland Isles where, in the early summer, vessels hailing from all the English and Scottish ports may be seen. Each boat's funnel is marked with the first and last letters of the name of its home port. The Lowestoft drifters, for example, bear the letters LT painted boldly on the funnels. As the months pass the boats follow the fish until they reach as far south as the coast of East Anglia.



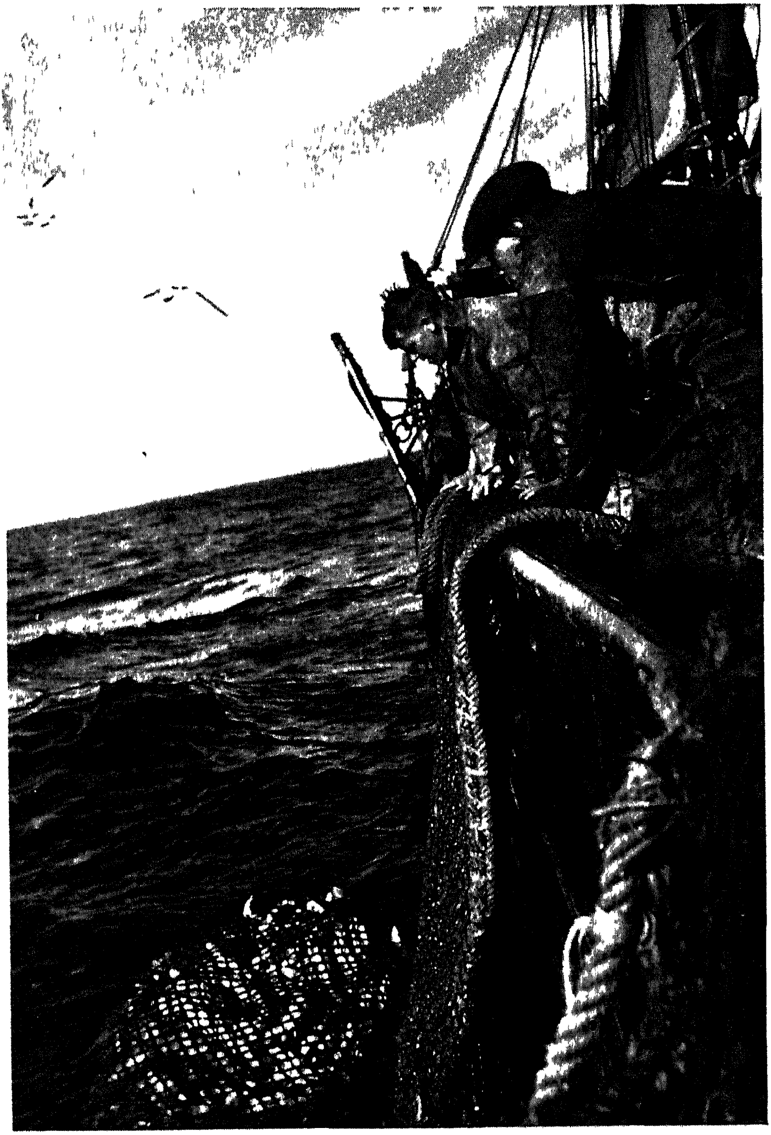
THE CONTINENTAL SHELF

The herring-fishermen sail in drifters, which are small steam vessels carrying a drift net. When the net has been cast, only the inflated skin bladders, or " dogs ", supporting the net can be seen. With corks fastened to its upper edge, and stones or lead weights tied to the bottom, the net hangs in the sea like a curtain. At the ends of the net float the " dogs ", which serve not only to suspend the net, but also to mark its position as it "drifts" with the tide. Sometimes as many as ten nets are cast, end to end, to stretch a total distance of two miles or so. Fish which swim into the net become entangled and held in the mesh, until, after a whole night of waiting, the men on the drifter pull the nets in, shaking the fluttering fish out on to the deck.

The herring are brought into port each morning. They are either prepared immediately for transport to a big fish market, like Billingsgate in London, or held back for " kippering ". If they are intended for transport they are either boxed up with ice, or barrelled in salt water. " Kippering " is carried out in most of the fishing ports themselves. Girls cut open and clean the fish, which are then hung up in wooden sheds and " smoked " over wood or peat fires. Most of the girls engaged in the work of sorting and cleaning are Scottish, and they travel southwards, following the fleets from port to port as the season advances.



HERRING DRIFTERS IN THE NORTH SEA



THESE TRAWLER FISHERMEN HAVE MADE A FINE CATCH
DO YOU NOTICE THE HEAVY SWELL ON THE SEA?

All this reminds us that a great industry like fishing gives employment to many people besides those directly engaged in it. Coopers who make the barrels, girls who clean the fish, boat-builders, transport workers on trains or lorries, fish porters and salesmen in the markets; all these people and many others, besides the thousands of fishermen, help to carry on the fishing industry of Britain. The work of catching and handling fish continues throughout the year because so many different kinds of fish breed in British waters.

From the fishing-ports of Cornwall, fleets of drifters sail to fish the pilchard and mackerel in the warm southern waters of the English Channel. These fish, and the herring, can be taken near the surface by drift nets. Other fish, however, like the plaice, sole, haddock, cod, halibut, and ling, live deeper in the sea, and are caught by trawl nets. The trawl net is like a huge net bag, and is not allowed to drift, but is drawn over the bed of the sea by a steam trawler. The trawlers travel far and wide for their catches, journeying very often along the coasts of Norway, Iceland, North Russia, Greenland, and even to Newfoundland. The boats which leave Aberdeen, Hull, and Grimsby, the three chief trawling ports of Britain, are sometimes away from home for three or four weeks. Trawlers are, of course, larger than drifters.

When a trawler returns to port, its catch is unloaded and arranged on the floor of the market. Within a few hours of the arrival of the vessel, thousands of fish have been sorted and arranged in long lines. Very quickly the fish is sold to the merchants who have been waiting the arrival of the boat. The fish is packed in boxes with ice which is supplied from huge ice-making factories.

Most of the catch is sent by rail from Aberdeen, Hull, and Grimbsy, to the big fish-markets, of which the chief is the London market of Billingsgate. At these " inland " markets the fish is again sold, this time to smaller dealers, like the fishmongers. The early-morning scene at a big fish-market is one of ceaseless noise and activity, for the fish must be got away to the shops with the least delay. Trains from the ports are hurriedly unloaded. Fish-porters, laden with heavy boxes, jostle one another as they load numberless lorries, while the buyers and sellers of the fish stand with note-book and pencil, calculating prices, keenly watching the loading.

Some of the cod and halibut are used for making cod-liver oil and halibut-liver oil, both of which are very valuable in strengthening invalids and in preventing disease.

When next we see the fish displayed for sale on the white marble slab in the fishmonger's shop, we shall remember the large number of people who have risked so much, and worked so hard, to supply us with it.

## QUESTIONS

1. Why do the seas around Britain form good fishing-grounds?
2. To what other people besides fishermen does the fishing industry give employment?
3. Which fish are caught by trawlers, and which by drifters?

## EXERCISE

The annual value, in millions of pounds, of various kinds of fish landed in the British Isles is: 3½ (Cod), 3 (Haddock), 2 (Herring), 1½ (Plaice).

Draw fishes proportional in length to these values.

## CLOUDS

*Cumulus*: White, heaped-up like cotton-wool (from 2 to 3 miles high). Picture A, opposite.

*Nimbus*: Black rain clouds (very low). Picture B, opposite.

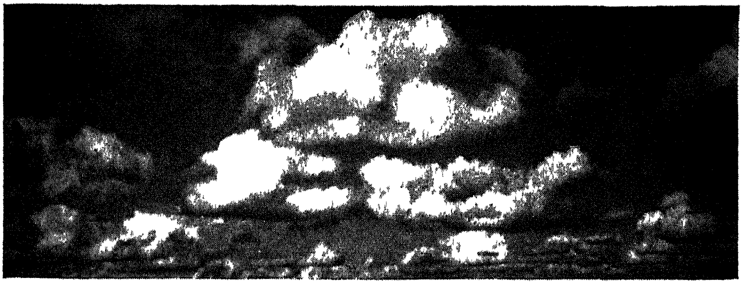
*Cirrus*: " Mares' tails " (5 to 7 miles high). Picture C, opposite.

*Stratus*. Horizontal layers (seen on the horizon at sunrise or sunset). Picture D, opposite.

*Exercise.*

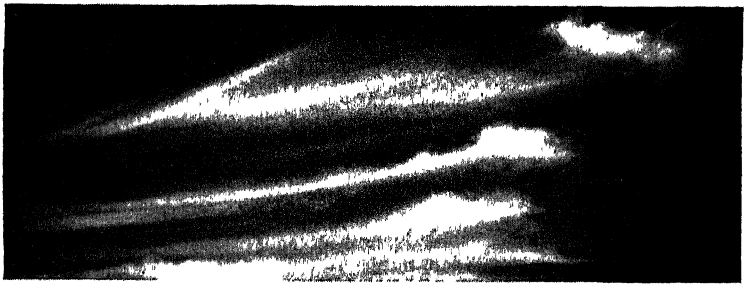
Enter in your note-book the dates on which you see any of the above cloud formations. Write the date, the name of the cloud, and the weather which followed.

A

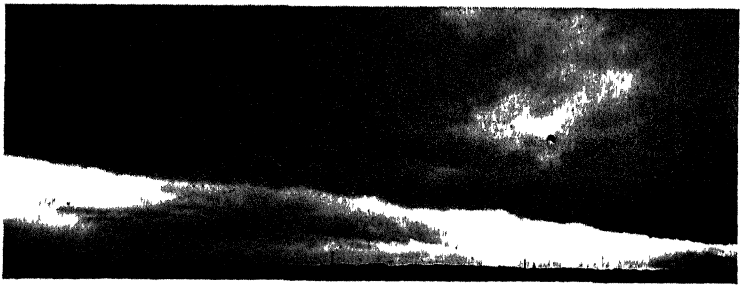


B

C



D



## CHAPTER 13

# LONDON, THE WORLD'S GREATEST CITY

People sometimes say that visitors know more about London than Londoners do themselves. This is often true, for the millions of people who live near the great city take most of its wonders for granted.

The visitor to the city, on the other hand, is on holiday. He has heard and read about the Houses of Parliament, Westminster Abbey, St. Paul's Cathedral, Buckingham Palace, and other famous buildings which tell of London's enchanting history, and he means to see them. The whole world is interested in the life of London, the capital of England and the chief city in the British Empire. Although every visitor to London is proud of his own home town, no one seems jealous of the greatness of London or denies its world-wide importance.

Within the confines of Greater London live eight million people (more people than in any other six towns in Britain put together), who have to be fed and clothed by work carried on in connection with its factories and docks.

We have already dealt with London as a port, and seen that it is easily the largest port in the world. We already know that Britain, lying as it does in the very centre of the land hemisphere, is in a fortunate position. We have seen that Britain has a warm temperate climate, which enables its people to work all the year round, and at all hours of the day. Britain, too, is blessed by a surrounding ocean with warm currents, which makes its climate equable and keeps its ports free from ice. All these inestimable benefits are enjoyed to the full by London. The city has grown steadily and naturally with the rest of the world. But it has one great advantage over even the other large towns in Britain itself. It is surrounded by the Central Plain of England, across which goods can be brought easily by river, rail, and road, from the various manufacturing centres in the more mountainous west and north. Railways from these towns converge on London and add to its trade.

Its central position, too, has enabled it to receive raw materials for vast manufactures of its own, and has built up its unique wholesale markets. Silk weaving at Spitalfields, watchmaking at Clerkenwell, pottery-making at Lambeth, leather-tanning at Bermondsey, cabinet-making at Shoreditch, and tailoring in Stepney and Whitechapel, are only a few of the many large industries carried on within its borders. Everybody knows of the markets at Covent Garden.

Billingsgate, and Smithfield, for fruit, fish, and meat respectively, and the more select markets in Mark Lane and Mincing Lane for tea, corn, and wine.

Land in London is so very valuable, and rents are so high, that the chief industries carried on use raw materials which make up into valuable articles. To support the industries and commerce of London, shipping, transport, and banking interests must have their headquarters. Many streets which lead into the thickly congested square facing the Mansion House are lined by the magnificent offices of shipping and insurance companies. The Bank of England stands secure behind its high walls, and bareheaded men run to and fro in "the Street" outside the Stock Exchange in this centre of the financial life of London.

London's world position also makes it important as a news centre. At almost every hour of the day newspapers are rushed out of Fleet Street by swift vans and by newspaper boys, while the adjoining streets and courts are studded with printing offices. Any piece of news or "report" finds its way into print in a few minutes.

All this can give but a slight idea of the work-a-day happenings on which the real importance of the city depends. But the visitor is not so much interested in the trade as in the history and the beauties of London, and there is sufficient variety to satisfy the tastes of

A VIEW OF ST. PAUL'S CATHEDRAL, LONDON

AN AERIAL VIEW OF A PART OF LONDON. THE BRIDGE NEAREST THE TOP OF THE PICTURE IS THE TOWER BRIDGE anyone. Few cities have had such an entrancing history. Since the first bridge was built, where both river banks were firm enough to carry the foundations, roads have radiated to all parts of the country. The Romans measured their distances in Britain from the " London Stone ", now to be seen in the wall of St. Swithin's Church, Cannon Street. London became the gateway for invaders from Europe, some of them warlike, some peaceful, bringing new ideas and increasing trade with the rich lands across the narrow seas. From time to time grew up those historical buildings which tell the story of the growth of the British people.

London stretches for miles on both sides of the Thames. To-day there are twelve wide bridges across the river, and the growth of the city continues. The city is ever changing and enlarging. The main thoroughfares are so congested that " tube " railways travel in every direction underground, and wide " arterial " by-roads have been made to avoid a journey through Oxford Street and the Strand or along the Embankment — streets literally crammed with buses and motor-cars and people.

Magnificent new buildings tell of changing ideas and modern needs. The dome of St. Paul's Cathedral still dominates the City, the Houses of Parliament (with Big Ben) and Westminster Abbey are still the chief among the older attractions of the "West End", but the lofty white stone buildings of Broadcasting House, the London Transport Offices, Shell Mex Buildings, and the new County Hall, tell the story of recent inventions, and the problem of government in a twentieth-century city.

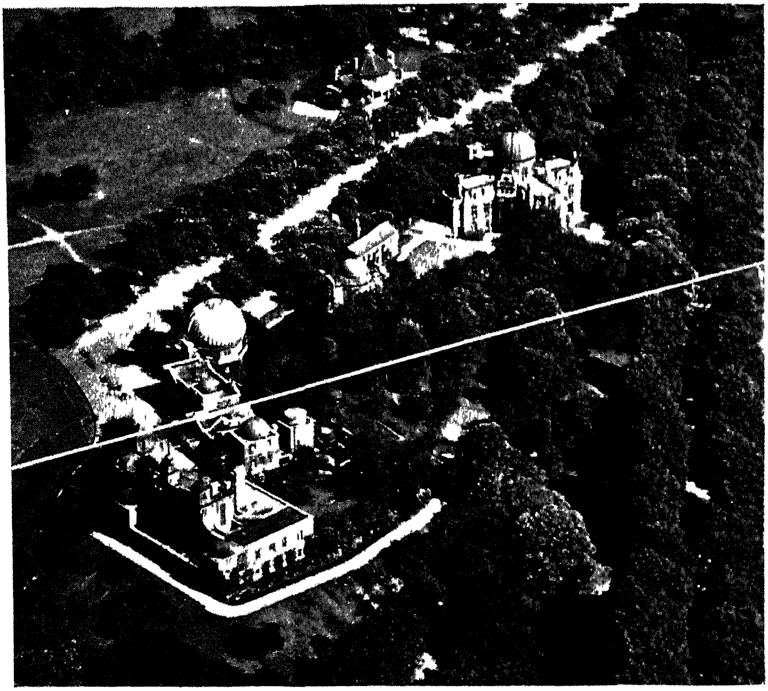
Any single part of London would take weeks to explore, and something of fresh interest would be found at every visit; often one building alone, like the British Museum, would repay months or even years of study, for the history of the world is preserved within its walls.

At times, too, the old and the new are found startlingly side by side. Greenwich, with its long range of buildings fronting the south bank of the river, has its Hospital, its Royal Naval Museum, and its Observatory. The Hospital occupies the site of an old royal palace where Henry VIII and Queen Elizabeth were born. The time-ball at the Observatory falls precisely at 1 p.m. every day, and the correct time is then telegraphed to all the most important towns. The Greenwich Meridian, or the line 0° longitude, passes within a few yards of the Observatory gates, thus making Greenwich of great importance to the shipping of all nations, because mariners calculate their position from a knowledge of "Greenwich time". Adjoining Greenwich Park is Blackheath, where highway robbers used to hold up travellers to the City, and where Wat Tyler marshalled his rebel hosts.

Deptford, also south of the river, is proud of being the meeting-place of Queen Elizabeth and Sir Francis Drake on the deck of *The Golden Hind*, but more important to-day are its Royal Victualling Yard, and its docks, which play their part in sending modern " Golden Hinds " to lands forbidden to the Elizabethan " sea-dogs ".

In Chancery Lane, within sound of the ceaseless roar of the traffic, is the Record Office, where the Doomsday Book lies open in its large strong glass-covered chest for all to see how the country was shared among William the Conqueror's Norman friends.

London has more than history, trade, and traffic to interest a visitor. Behind its busiest streets, hidden from all who do not know, lie some of the most beautiful and restful spots in the whole world. Through an archway leading out of busy Holborn one comes immediately upon Staple Inn, a part of Dickens' land with its old-world courtyard. " Staple Inn ", wrote Dickens, " is one of those nooks the turning into which from the dashing street imparts to the relieved pedestrian the sensation of having put cotton wool in his ears and velvet soles on his boots."



GREENWICH OBSERVATORY. THE WHITE LINE HAS BEEN PUT IN TO MARK THE GREENWICH MERIDIAN OR 0° LONGITUDE

And what shall we say of the magnificent parks, many of great extent and bearing the most beautiful trees and flowers imaginable? Where shall we find another Hyde Park, or Regent's Park, with its "Zoo"? Leave the whirl of traffic in Trafalgar Square, pass under the Admiralty Arch, and walk along the grass-bordered Mall to Buckingham Palace, and you might be miles away from the work-a-day world.

London cares for every side of the lives of its citizens. Tennis at Wimbledon, cricket at Lord's and the Oval, " rugger " at Twickenham, and " soccer " at Wembley attract immense crowds of first-rate sportsmen, while hundreds of local parks and football grounds are alive with young people every Saturday afternoon. For evening pleasure, the theatres of London have been world-famous ever since Shakespeare's time.

When we think of the very many railway stations opening on almost every main street, we return again to the business world. Whether we travel on the Underground, or on one of the main line services, we find all the stations linked up with some great terminus, with its dozen or more platforms sending forth every few minutes a crowded train on the way to the Continent or to one of our industrial areas. Birmingham, Manchester, and Leeds, even Glasgow and Belfast, are all within a few hours of the London docks.

The most noteworthy feature in London's modern history is the rapid industrial development of Greater London. Hundreds of factories are being built every year, new suburbs are spreading over every suitable building site, and London is more than maintaining its position as the world's greatest city.

## QUESTIONS

1. How has the position of London assisted its growth?
2. Name three districts in London which have special manufactures.
3. Give the names of three very old buildings in London, and three modern ones.

## EXERCISE

The chief imports of Britain (in millions of pounds' worth) are:

Food: Meat, 80, Grain and Flour, 60; Dairy Produce, 60; Fruit and Vegetables, 35.

Raw Materials: Wool, 40; Cotton, 40; Timber, 40; Leather, 15; Iron Ore, 5.

Draw to scale and label rectangles to compare the values of our imports.

## DRAWING PLANS TO SCALE

1. Draw the plan of the top of your desk, using a scale of 1 inch to 1 foot.
2. Draw the plan of your classroom (not the furniture in it), using a scale of 1 inch to 1 yard.
3. Draw the plan of your playground, using a scale you think suitable.